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Mobile Industry Outlook 2006

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Published in November 2005

ISBN: 1 8431 149 33

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INTRODUCTION

Introduction

It's pretty difficult to tell one mobile operator from the next, says ***Mark Newman****. For all the hundreds or millions of euros, or dollars, that operators spend on creating powerful brands, the perception of most customers is that there's little to choose between them. So, will convergence lead to a divergence of mobile operator strategies?*

Mobile operators tend to target the same customers, the range of network services and handsets that they offer is invariably identical, there's little to chose from them in terms of coverage (except where there's a relatively new operator building out a network), and it's becoming impossible to work out who's the price leader and who's offering a premium service.

This *status quo* tends to suit incumbent operators. It has proved incredibly difficult for third and fourth placed operators to make a sizeable dent in the market shares of the first or second operators: the exception is the UK where T-Mobile and Orange are now neck-and-neck with Vodafone and O_2. Any attempt to become more aggressive in terms of pricing or handset subsidies has tended to elicit immediate responses from the incumbents who hold all the trump cards in terms of distribution, retail, economies of scale and entrenched customer bases. Despite this, the tier two operators have stuck doggedly at their task hoping that the growth of the market as a whole will lead to an improvement in their profitability.

But 2006 could be the year when the structure of mobile markets and the strategies of operators begin to change. We believe that operator strategy will be driven by the following trends in the marketplace:

1. The unsustainability of a mobile operator business model founded on high subscriber acquisition costs (principally handset subsidies), high churn levels and falls in the price per minute of mobile voice telephony.

2. Convergence and quadruple play. PSTN operators such as France Telecom, Telecom Italia, BT and NTT are resorting to desperate measures to rescue their ailing PSTN businesses. This involves the deployment of IP-based networks to a) slash opex, and; b) roll out converged fixed-mobile-TV-broadband services, that will allow the end-user to make 'mobile' calls at home or in the office at PSTN rates.

3. The rapid evolution of the mobile virtual network operator concept and operators' realisation that a wholesale strategy can, in some cases, be more profitable than a retail business.

4. The impact of IP and, in particular, VOIP which is rapidly driving down the price of voice telephony.

5. Mobile operators' mounting frustration with their inability to derive meaningful revenue streams from mobile data services (not including SMS). Many are now starting to come to the view that off-portal strategies, where revenues are derived principally from traffic and billing services, may be a more lucrative approach.

Let's look at each of these in turn.

Handset subsidies

Mobile operator business models – in terms of giving customers subsidised handsets and recouping the cost over the contract period – have remained unchanged since the advent of cellular communications. Indeed, the subsidisation of the handset is, arguably, the main reason today for the massive growth of cellular ownership.

But in developed markets, where subscriber growth has slowed markedly in the last couple of years, operators are now more focussed on growing their profitability than simply growing their subscriber base. And it doesn't take too much analysis to see that the basic economics of handset subsidies are looking increasingly dubious.

In markets where 3G has launched, operators are having to increase handset subsidies. 3G phones cost more to manufacture than 2G models but operators have been forced to offer them at a similar price to get them out into the market. There is some logic to this approach. There's no point in investing in a strategy to supply mobile music, mobile games or mobile TV unless you have a critical mass of customers who can access these services. But the problem is that there is little evidence today that operators are generating the revenues from these new services to justify the higher subsidies.

The most recent figures from European mobile operators indicate that the average mobile phone user is spending in the region of €5-8 per month on non-voice services but that just €1 of this is derived from services other than SMS. Most operators are happy to offer their customers subsidised phone upgrades within one to two years, which means they are deriving only €12-24 in non-SMS data revenues for each advanced phone they are giving their customers. If you then compare the wholesale price of a 3G phone (€200-300) with that of a basic voice/SMS device – Motorola is now manufacturing such phones as part of the GSMA low-cost handset initiative to sell for €40-50 – it becomes clear that operators are not getting value for money.

Furthermore, there is nothing to suggest that either handset subsidies or churn levels will fall. The Carphone Warehouse is seeing handset replacement rates fall to around 10 months – down from 12 months at the start of this year. This is as good an indication as any that churn rates are on the rise. Our survey of operators and manufacturers (see the full results of our 2006 mobile industry survey in the Appendix on page 179) supports this view. Most

European and North American operators said they expected handset subsidies to remain at the same level in 2006 as 2005 with the balance evenly divided between predicting a fall and a rise in subsidy levels. But when it comes to churn levels, nearly half of European operators predicted an increase. US operators were more optimistic, while 57% of operators in the Asia Pacific thought that churn levels would rise in their markets.

Operators have, on occasion, tried to lower handset subsidies but find themselves caught between a rock and a hard place. Any operator that cuts handset subsidies knows that it is going to see its share of new connections plummet. And any attempt to work with other operators to agree on a phased approach by all operators to bring down subsidies will be seen as being anti-competitive. But operators such as E-Plus in Germany and Denmark's TDC have taken a different approach. They have adopted a wholesale strategy. This means that even if their share of the retail market shrinks, their overall profitability increases. Furthermore, by owning or part-owning a leading MVNO (E-Plus owns Simyo and TDC owns Telmore – see section on MVNOs) they are also getting a share of the retail business.

We reckon that in 2006 there will be more operators adopting a wholesale/MVNO model to find away around the handset subsidy dilemma.

Fixed-mobile convergence and quadruple play

Where Orange once trumpeted 'a wirefree future', the vision is now of 'a total communications company'. France Telecom, Orange's parent company, is now draping the Orange brand over the group's entire fixed and mobile communications portfolio with a particular emphasis on 'convergent' services. Orange now wants to be the provider of families' (and businesses') total communications needs – home phone, home broadband, home mobile and, potentially, home TV.

France Telecom is not alone in its aspirations. Telecom Italia and NTT have both taken steps to reintegrate mobile divisions back into their parent companies. While the operators will claim that this is an offensive play – to capitalise on the opportunity presented to them by IP and broadband communications – in truth it is more of a defensive approach designed to slow, and ultimately reverse, the haemorrhaging of their PSTN business.

While individual quadruple play and FMC strategies may vary, the basic concept is the same. It involves using the broadband pipe into the home to carry mobile and fixed voice, broadband, video and broadcasting services into home. Content will be piped around the home by Wi-Fi.

As far as the pure 'mobile' dimension of quadruple play is concerned, the strategy will require the adoption of integrated cellular/Wi-Fi handsets. In the home the handset will be like a cordless phone and operators will charge calls at the PSTN rate. Operators with Wi-Fi hot

spots in public places – shopping malls, airports, hotels or in peoples' offices – also have the option of charging end users a PSTN rate here too.

For these integrated fixed-mobile operators such a strategy will involve a massive diversion of traffic away from the conventional 'fixed' telephone and PSTN and onto their IP networks and cellular phones.

So, where does this leave pure mobile operators? In our survey, 65% of mobile operator respondents said that integrated fixed-mobile operators were best placed to benefit from IP and convergence with only 6% citing mobile operators as beneficiaries. Interestingly, a third of all the respondents said that MVNOs and ISPs were in pole position. Mobile operators don't have broadband connections into the home unless they become ISPs.

But there is nothing to stop mobile operators from adopting a pricing strategy that mimics an FMC service. Home-zone technology and pricing is a concept that's been around for several years now but only one European operator – O_2 Germany – has a successful home zone service. When it was introduced in some other markets there were problems with 'defining' the home zone with some customers complaining about calls being picked up by base stations outside the home zones and, as such, being charged at a higher rate. And operators never really offered low enough home zone prices to make the service an alternative to the home phone.

With integrated fixed-mobile operators going down the FMC route it may be time for mobile-only operators to re-examine the home-zone concept. The real question though is whether cellular coverage in the home will be good enough to rival a home Wi-Fi base station service. And will mobile operators be able to create a business case that allows them to set home-zone rates at close to the PSTN.

MVNOs and wholesale mobile

Anyone involved in the U.S. wireless sector in the second half of the 1990s will, almost certainly, be familiar with a start-up venture called NextWave. The company is synonymous with the 1996 PCS licence auctions where it successfully bid US$4.2 billion for licences to cover a large part of the U.S.

The company eventually went bankrupt and – after a long, drawn-out legal wrangle with the FCC – the spectrum ended up in the hands of Verizon Wireless. But before things went pear-shaped for NextWave, the company did come up with an innovative business strategy which – nine years later – is beginning to gain some popularity among Europe's second tier mobile operators.

NextWave had planned to be a wholesaler of mobile capacity. It signed up contracts with local and long-distance telecoms operators for millions of minutes. Operators like MCI, which had no spectrum of its own, planned to become an MVNO on the NextWave network. NextWave would not have a retail business at all – it decided that it was too costly to build a retail presence and brand and, furthermore, such an approach meant that its customers would never feel that there was a conflict of interests.

Around the same time as NextWave hit the buffers with its failure to find financial backers, European (and to a lesser extent U.S.) cellular operators were being seduced by the promise of 3G. This they saw as an unmissable opportunity to get out of the dull, old mobile telephony business and reinvent themselves as dotcoms or (after the bubble burst) media giants.

Many mobile operators retain their 3G visions today. But others – particularly the tier two operators – are taking a more sanguine view about the prospects of 3G and their role in delivering advanced services.

Dutch operator Telfort was one such operator when management bought out the firm from mmO$_2$ in 2003. Fifth and last in a small market where four of the giants of the European mobile scene owned an operator (Vodafone, France Telecom, KPN and T-Mobile) Telfort quickly came to the conclusion that it was not going to be able to grow its share of the market via the traditional route – offering higher bonus payments to be converted into handset subsidies – into the channels. Instead, Telfort based its growth strategy on a wholesale model. So successful was Telfort that earlier this year KPN agreed to acquire the company for €1.1 billion – forty times what management paid for it less than two years previously. In this time Telfort's wholesale connections had grown to 40% of its total subscriber base.

It would be highly surprising if KPN does not continue to pursue the wholesale approach upon completion of the Telfort acquisition – after all, this is what made Telfort so successful. KPN is already pursuing a wholesale strategy in Germany. E-Plus, one of Germany's tier two operators and a KPN subsidiary, embarked on a wholesale strategy this year after coming to the conclusion that it could not justify the high retail subsidies required to start making inroads in the market shares of T-Mobile and Vodafone.

For 2006, we expect other mobile operators to go down the wholesale route. In the short term such a strategy will be geared towards the provision of voice and SMS services. However, in the medium to long term these operators will be looking to recruit entertainment, media and enterprise MVNOs to help monetise their investment in 3G and wireless broadband. We are already seeing such a strategy emerge in the U.S. where mobile multimedia services are a key driver in MVNO activity.

The impact of IP

From a mobile operator's perspective there are two ways of looking at IP. The first, and the one which grabs most interest, is as a disruptive technology which takes Internet economics and business models into the cosetted, comfortable business of mobile telephony. The second is an altogether more attractive prospect for mobile operators: IP is a technology which allows operators to slash their operational costs and build a platform for the delivery of advanced, high speed services.

Integrated fixed and mobile operators are rushing headlong into IP with the implementation of IMS and SIP technology. They have little choice. VoIP service providers are running amok and they need a radical strategy to help protect their PSTN businesses.

But from a pure mobile perspective the impact of VoIP is still unclear. Wi-Fi is now being integrated into a number of new higher end mobile phones. The real question is what mobile operators can do to reduce the risk of their customers making wireless VoIP phone calls when they are within range of a Wi-Fi hotspot at home, in the office or in a public place. There has been talk of mobile operators buying in the technology to stop their customers from being able to make wireless VoIP calls 'outside' their home network, but none have categorically stated that this is something that they are going to do.

For all the uncertainty, one thing is clear – mobile voice prices are on the slide. In our survey, we asked mobile operators in different regions how much they expected mobile voice prices to fall by in 2006. 54% of respondents said they expected prices to fall by up to 10% in 2006 while a further 25% said the expected a 10% to 25% price decline. To protect revenues and profit margins mobile operators will start to target PSTN minutes more aggressively. In most mature markets mobile operators are, collectively, generating similar revenues to fixed operators. And yet they are generating only 25% of 'originated' voice traffic.

Monetising mobile data

It's proving harder and slower than most mobile operators imagined to build new revenue streams from mobile data services. For all their endeavours, mobile operators in Europe and North America are generating little more than US$1 or €1 per month in non-voice and non-SMS revenues. Compare this with Japan where DoCoMo is earning US$17.50 per month in non-voice services (although this figure does include mobile e-mail, which is used instead of SMS).

In our survey of mobile operators, mobile music and e-mail came out as the services which mobile operators expected to generate most interest in 2006. This was followed by games and TV (2006 is too early for mobile TV technology and business models to take shape). Among handset manufacturers mobile music was, by a long stretch, the most popular choice with 56% of the vote followed by mobile TV (19%), e-mail (14%) and games (11%). This

may reflect handset manufacturers' enthusiasm for music phones – it forms a central thrust, for example, in the strategies of Motorola and Sony Ericsson – rather than genuine end-user interest in different services.

While services such as music and TV show great promise, operators are fast coming to the realisation that there may be more money to be made by helping their customers reach the services that they want rather than taking a large revenue share in a relatively small menu of services. DoCoMo only takes 9% of the revenues generated by its 'official' i-mode partners in Japan and only the 'traffic' component of i-mode usage outside the official menu. Furthermore, non-official (ie off-portal) traffic now represents 60% of total i-mode page impressions.

Services such as T-Mobile's 'web 'n' walk' show that western European operators are now coming to the view that they need to shift the focus away from portal-based services to off-portal strategies. Even Vodafone, which has invested hundreds of millions of euros in its live! strategy, is now starting to talk enthusiastically about off-portal services.

So, where's the mobile industry headed?

These strategic issues are not meant to convey the impression that the mobile sector is, in any way, suffering a crisis of confidence. Indeed, the recent spate of M&A activity is a sign that the industry has, at last, recovered its bullishness after the bursting of the technology bubble and the 3G licensing fiasco.

But at the same time, mobile operators need to keep their feet on the ground.

The arrival of IP and services based on unlicensed wireless networks will fundamentally change the mobile landscape over the next five years. Until now, spectrum 'ownership' has allowed mobile operators to control the marketplace. Over the next five years operators will lose this control. With the breaking down of the barriers to entry, price competition will inevitably follow. And if operators are to preserve profitability they will have to either cut costs, develop new revenue streams, or both.

Operators will, increasingly, look to cut costs – through the use of IP, outsourcing parts (or all) of the network, and by reining in handset subsidies. At the same time they must continue to look for new revenue streams. New mobile entertainment services may be part of the mix but more coherent wholesale strategies and innovative pricing schemes designed to take more traffic away from the fixed network could ultimately provide greater rewards.

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Mark Newman is Chief Research Officer

Mark leads Informa Telecoms & Media's global research and business intelligence teams with responsibility for developing our thought leadership programme. Mark brings 17 years of experience in the telecoms and media research and publishing sectors and is a regular speaker and moderator at international conferences and regularly contributes to wider media.

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KEY THEMES FOR 2006

Mass market 3G

It is a misconception to say that 3G has been unsuccessful, says ***Gavin Patterson****. The technology may not have been mature from day-one but, over the four years since the first WCDMA network launched in October 2001, subscriber growth has outperformed that of both first generation analogue and second generation digital networks.*

Q: Is it fair to say the public been slow to migrate to 3G services?

Gavin Patterson: Not really. I think that the industry expected 3G, or at least WCDMA, to become an instant replacement for 2G, but the technology was not ready. It was rushed to market, had a lot of wrinkles and was badly packaged. The migration is beginning now because not only does the technology work, but it also looks good and there is widespread availability of cheap and attractive handsets.

The experiences of DoCoMo in Japan are really a microcosm of what happened across the whole industry. DoCoMo was late to launch, and when it did, the operator only offered single-mode WCDMA handsets. Content was available via its highly popular i-mode service, but DoCoMo had trouble in migrating users from its nationwide PDC network to a patchy WCDMA network with no capability to support 2G roaming. The company had originally targeted 1.38 million 3G subs by March 2003 but later had to lower its forecast to just 320,000.

Growth was eventually driven by the introduction of dual-mode/dual-band PDC/WCDMA handsets - part of the carrier's ¥40 billion (US$335 million) FOMA handset R&D assistance programme announced in 1Q03 – which allowed DoCoMo to circumvent holes in its 3G coverage. The 1-million subscriber milestone was passed in September 2003, with 5 million users clocked up just 10 months later in July 2004. On December 25, 2004, DoCoMo launched the N900iG, a handset which operated on GSM/WCDMA networks in roughly 115 countries around the world. By end-February, DoCoMo had a total of 10 million 3G subs.

Similarly, WCDMA operators in the rest of the world saw the lack of attractive and cheap 3G handsets blight their own launch plans. Networks were rolled out and declared 'commercial' when only data cards were available for customers to use. Some of the larger operators had already developed portals which could be used to deliver content over 3G, such as Vodafone live!, T-Zones, Orangeworld, emocion and Active – not to mention i-mode – but their subscribers would not pay through the nose for handsets which did not offer comparable form factor, weight and battery life to 2G models.

When Hutchison Telecom launched its first European 3G services in March 2003, its customers were mostly signing up for cheap voice services. The 'early adopters' were a distinct minority. However, as of Aug. 24, 2005, Hutchison reported that its 3 Group of companies in Europe and Australia had 8.99 million subscribers generating ARPU of €43.11 of which 23% was derived from non-voice services. Again, growth has been driven by the greater availability of a wider range of 3G handsets coupled with the increased availability of next-generation services.

By mid-2005, there were a total of 74 WCDMA networks in 34 countries, and about 180 WCDMA device models available from 26 different vendors. "A year ago, most of the WCDMA devices were driven by the FOMA market," said Alan Hadden, President of the Global Mobile Suppliers Association. "Now it's basically [driven by] the global market."

Q: Will 2006 be the year that 3G eventually takes off?

Gavin Patterson: Certainly 2006 and 2007 is when we are going to see 3G services start to reach gain mass-market proportions, but 3G sales have not exactly been disappointing to date. NTT DoCoMo was the first operator to launch commercial WCDMA services in October 2001. By end June, 2005, less than four years later, the Japanese operator had signed up 13.15 million 3G subscribers and there were a total of 28.2 million WCDMA subs worldwide. On top of this was a further 15.1 million 1xEV-DO subs for a global total of over 43 million 3G users. A month later, there were more than 50 million 3G subscribers worldwide, comprising 33 million subs on WCDMA networks and another 17 million EV-DO users.

Compare this with cellular. Telia and Telenor launched the first NMT450 networks in late 1981. By end-1985, a little over four years after its birth, there were a grand total of 907,957 subscribers worldwide.

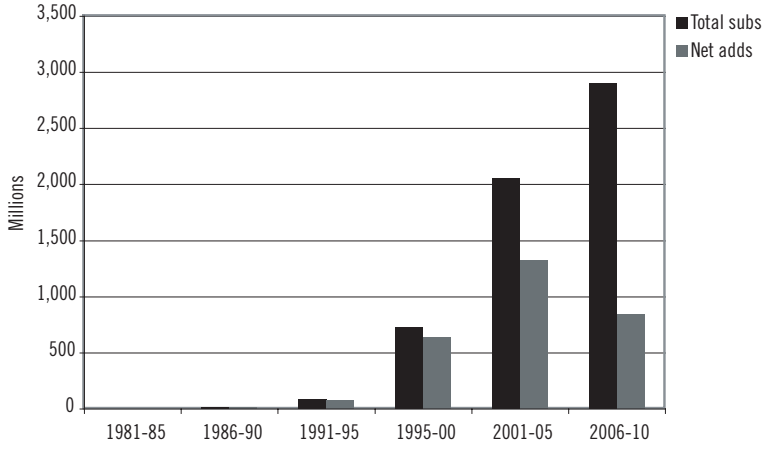
By the end of 1990, another five years down the line, and the total subscriber base had risen to just 11.9 million. And end-1995 – just 10 years ago, but almost 15 years after the first calls were placed in Finland and Sweden, there were still only 87.69 million subscribers worldwide.

And if you only compare 3G to the take up of digital technology then, again, 3G comes out on top. The first GSM networks launched at the beginning of 1992, closely followed by PDC, and it took five years to sign up a total of 50.76 million subscribers. Of these, 32.82 million were hooked up to GSM, 13.92 million to PDC, 2.64 million to TDMA and 1.05 million to CDMA.

By the end of 2005, that is just over four years from the first commercial launch in Japan, Informa Telecoms & Media forecasts the total 3G user base at 70.6 million, much more than either analogue or digital cellular systems managed in the same time-frame.

Figure 1: Growth of the mobile market worldwide (1981-2010)

millions	1981-85	1986-90	1991-95	1995-00	2001-05	2006-10
Total subs	0.91	11.90	87.69	728.65	2,057.70	2,902.29
Net adds	0.91	10.99	75.79	640.96	1,329.05	844.59



Source: Informa Telecoms & Media

So in terms of 3G subscribers, yes, we're still at the bottom of the hockey stick, but growth is set to explode. Informa Telecoms & Media forecasts about 135 million 3G users by end-2006 and almost 800 million by end-2010.

Q: Is increased 3G migration now being driven by better handset functionality and availability?

Gavin Patterson: Functionality and availability obviously have a large role to play. Larger colour screens are important for game-playing, all new phones now come with built-in camera functionality and, increasingly, MP3 players as well.

The weight of 3G handsets is also falling rapidly - from 150g to 120g in the 12 months to September 2005 - while a small number of 3G phones, such as the Samsung Z500, even weigh less than the 100g benchmark for most 2G phones today.

But perhaps more importantly the unit costs of 3G handsets are also getting lower. By the end of 2005, the unit cost of 3G handsets was falling towards the €200 (US$250) level compared with between US$300 and US$400 at end-2004, and 2G/3G handset prices will continue to converge into 2006.

So, after two years of fairly disappointing sales, especially in Europe, the 2005 yuletide season should see more and more subscribers migrating to 3G price plans attracted by cheaper, and much more improved, handsets.

According to Vodafone UK, 2005 will be the first Christmas that operators will start to see a definite shift from 2G to 3G subscribers. In 3Q05 Vodafone UK recorded 684,000 3G net additions, 48,000 more than 3 UK, and is on track to hit 10 million 3G subs by 1Q06.

The operator attributed the strong take-up rates to a discount promotion offering free 3G handsets along with a 50% discount on the first six months of an 18-month contract for subscribers. In tandem with the offer, Vodafone also launched 15 new 3G models in time for Christmas.

Q: When will we see 3.5G networks like HSPA and 1xEV-DO Rev. A?

Gavin Patterson: Many operators, such as Cingular Wireless in the U.S. and SK Telecom and KTF in South Korea, waited for HSDPA before fully commercialising their WCDMA networks.

Cingular says it will have WCDMA/HSDPA networks operating in 15 to 20 markets by the year-end and intends to deploy networks in more than 100 markets by 2008. South Korea's KTF expects to rollout HSDPA in 17 major metropolitan areas by end-2005 and expand coverage to 45 more cities by June 2006 while SK Telecom plans to begin service in April 2006.

SK Telecom will jointly develop HSDPA handsets with Samsung Electronics, LG Electronics and Pantech using DBDM chips. SK Telecom's target of 500,000 subs equates to 2.5% of its total subscriber base and about 8% of gross adds for the year.

The Korean operators each aim to sign up about 500,000 WCDMA/HSDPA subscribers during 2006. As of 3Q05, SKT had a total of 4,400 WCDMA (Rel. 4) subs and KTF just 300.

In total about 20 leading operators – including NTT DoCoMo, Vodafone, T-Mobile, Hutchison Telecom and O2 – were trialling HSDPA by September 2005. DoCoMo originally planned to launch HSDPA in early 2006, but has since postponed to later in the year, while Vodafone started a series of pilot tests in Japan and Italy towards the end of 2005 after successfully completing HSDPA data transfers in mid-year.

T-Mobile Netherlands announced a pre-commercial HSDPA trial, with so-called friendly users in 4Q05 while Hutchison was expected to launch HSDPA trials with NEC-Siemens in Rome and Milan by end-2005 before offering commercial services in spring 2006.

As for Revision A, LG Telecom is expected to run a Rev. A trial from Lucent Technologies in 2Q06, set up a commercial version in 3Q06 and launch by year-end.

Lucent has also completed tests with Verizon Wireless and plans to carry out more extensive tests in 2006, while Japanese operator KDDI plans to begin deploying Rev. A before end-2006, having struck an US$800 million deal with South Korean vendor Samsung for EV-DO equipment, including Rev. A.

Gavin Patterson is a Principal Analyst and Editorial Director

Gavin is responsible for the editorial content across Informa's research services. Vastly experienced in analyzing global operator strategies, Gavin is a regular fixture at international conferences, speaking on technology development strategy.

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Wireless VoIP

VoIP has already begun to change the economics of the fixed telecoms industry and now the mobile market could be facing a similar threat, says ***Anthony Cox****. Mobile operators are facing the fact that their business users in the future are going to demand wireless VoIP services, but are beginning to find ways of turning VoIP to their advantage rather than seeing it merely as a threat, says* ***Mike Roberts****. While VoIP service providers could bring out Wi-Fi enabled mobile handsets, they would struggle to distribute them. It is the operators with fixed and mobile divisions who are the most likely drivers of this market, requiring these devices to provide FMC, says* ***Mark Newman****.*

Q: What is VoIP and why is it important?

Anthony Cox: On the face of it voice over IP is merely a change in the way voice traffic is carried. Its importance, though, lies in that it changes the economics of telecommunications altogether. In the telecoms "old world" a voice call was set up as an end to end connection between two phones. With VoIP, voice traffic is broken into packets and treated as just another piece of data. As such it can be routed through data networks, including the Internet. This is cheaper because it is both more efficient and avoids the cost associated with interconnect between operators.

So far this has been most evident in the fixed world, with the advent of cheap Internet call providers like Vonage and Skype. With VoIP effectively turning any ISP into a voice operator, VoIP has also driven fixed operators to upgrade their networks (at huge expense) and eliminate inefficient layers of technology.

Q: How does it affect the mobile industry?

Anthony Cox: This remains to be seen; some of the same revenue-threatening effects that fixed operators have had to deal with are already apparent, particularly if the right mix of technology can be found. In the short term a wireless router and a mobile handset that can do Wi-Fi could carry VoIP traffic when a user is in their "home zone". Calls could skip onto a GSM network when a user was out and about. In this case mobile operators would lose out on local traffic. More serious for mobile operators would be if one of the VoIP start-ups like Skype "goes mobile", something which it appears to be looking to do.

Mike Roberts: Mobile operators have certainly been working frantically to come up with ways to defend against wireless VoIP – and also turn it to their advantage – and they are starting to make some headway. For example 3G operators in Europe will be rolling out

HSDPA over the next year or two, before wireless VoIP starts to have a major negative impact on revenues, and HSDPA could improve the speed and latency of WCDMA networks to the point where they could support VoIP services.

But why on earth would a 3G operator want to offer VoIP? Because business users are going to demand it, and 3G operators are well aware that mobile WiMAX services will be launching in 2007-08 and will support VoIP. Also, 3G operators could use VoIP to cut the costs and prices of voice services.

Q: Which operators are looking at mobile VoIP?

Anthony Cox: The German mobile subsidiary E-Plus is at the forefront of mobile VoIP and in September became the first mobile operator to offer Skype calls on its network. For €39.95 consumers can buy a package designed to allow VoIP calls over 3G data cards. This package received a lot of interest when it was launched – to the extent that Vodafone in Germany has even taken measures to block VoIP calls over its mobile data networks. Other operators are also looking mobile VoIP. The real threat to mobile operators will come when two things happen: first, 3G data has to come down in price, and second, VoIP software needs to be incorporated into handsets, something which VoIP operators like Skype are lobbying for already.

Q. What role is Skype playing in the wireless VoIP market?

Mike Roberts: We started writing about consumer VoIP over Wi-Fi a few years ago, but at the time everyone thought it would be very slow to take off partly because Wi-Fi doesn't support quality of service, and partly because there were no devices. Then Skype came along and people just started using Skype on their laptops at Wi-Fi hotspots and it worked. Then this year Skype really started to focus on going wireless and mobile, and at 3GSM World Congress in February 2005 announced a deal to add its software to Motorola handsets. That really got mobile operators thinking, because a free VoIP service is probably the last thing they want to see on mobile handsets.

Some mobile operators have certainly been battling wireless VoIP behind the scenes, even to the extent of developing plans to block VoIP services from their networks. But others are joining the trend.

Skype also continues to push into the Wi-Fi market, and in July launched its Skype Zones service, which offers unlimited VoIP calls for US$7.95 a month at the hotspots of service providers such as Boingo Wireless and The Cloud. "We think that business people who are travelling a lot internationally and spending a huge amount of money on roaming with their mobile phone will be able to save a bunch of money with this service," says Niklas Zennstrom, Skype CEO and co-founder.

Q. Can mobile operators actually stop their customers from making wireless VOIP phone calls?

Mark Newman: If the operator has bought the handset directly from the manufacturer and then puts it into the retail channel then yes, it can control what applications are loaded onto the device. There has been some talk about operators deploying a technology which allows them to hunt out, track down and 'kill' voice packets but so far none have publicly admitted that they are doing this.

There is nothing to stop a VoIP service provider from providing its own Wi-Fi-only or cellular/Wi-Fi handsets to its customers but they would have to find a retail channel and, most importantly, decide whether to subsidise them. I really can't see how they'll be able to compete with cellular unless they do this but, on the other hand, I am not convinced that they have enough visibility of subscriber revenues to justify the subsidy. One option for them would be to set up MVNO deals with mobile operators. Customers would use the VoIP capability at home or in the office and cellular elsewhere.

Q. Who's going to be driving the roll out of integrated cellular/Wi-Fi handsets?

Mark Newman: All the leading handset manufacturers are bringing out Wi-Fi enabled cellular phones although it is unclear to what extent mobile operators are driving this. I think a lot of the interest is coming from the likes of NTT, France Telecom and Telecom Italia who are integrating their fixed and mobile divisions and need these devices for FMC services. They want to offer FMC to protect their PSTN revenues.

Q. How are fixed-line incumbents reacting to wireless VoIP?

Mike Roberts: It depends on the incumbent. Keep in mind that wireless VoIP in a limited sense – that is, Wi-Fi VoIP – is a key part of fixed-mobile convergence services, and so a related question is how are incumbents approaching FMC? In general every major service provider worldwide is evaluating or actively developing FMC services since they could have such a major strategic impact on their current operations.

To take one example, UK fixed operator BT has launched Fusion, an FMC service that will use Wi-Fi VoIP for in-building voice services and GSM for mobile voice, both via a Wi-Fi-enabled mobile handset. Using Wi-Fi VoIP means BT can charge fixed-line rates for in-building calls, which it hopes will help Fusion compete effectively against mobile-only services.

Mike Roberts is a Principal Analyst

Mike is responsible for Informa Telecoms & Media's Wi-Fi and Broadband research element. He has been tracking and reporting on developments in breaking wireless technologies – including 3G, Wi-Fi, Broadband – for several years and is regularly called up as a leading authority to present at international conferences.

Mark Newman is Chief Research Officer

Mark leads Informa Telecoms & Media's global research and business intelligence teams with responsibility for developing our thought leadership programme. Mark brings 17 years of experience in the telecoms and media research and publishing sectors and is a regular speaker and moderator at international conferences and regularly contributes to wider media.

Anthony Cox is an Editorial Director

Anthony Cox has been following the fixed telecoms market for six years, initially as one of the founding journalists at *Telecom Finance*, where he was deputy editor. Following a year freelancing for major media groups, including Pearson and Institutional Investor, he joined Baskerville (now part of Informa Telecoms & Media) as editor of the fixed-line title *Telecom Markets*. Anthony has most recently conceived and designed a fixed-line database tracking worldwide DSL, cable and broadband and fixed-line connectivity.

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Mobile content

Operator strategies have taken several turns since content first became an important part of their agenda. Whereas operators used to invest heavily in their mobile content offerings, many have now started to focus on enabling brands and others to offer direct-to-consumer services instead. Here, ***Jessica Sandin*** *looks at the key trends and business models can we expect for mobile content in 2006.*

Q: There seems to be a lot of renewed enthusiasm around mobile content. Are we back to the heady days of WAP hype?

Jessica Sandin: Looking at some of the VC funding that's going into this space now, it's easy to worry. The enthusiasm and revenue expectations in some quarters is probably overblown – it will still take some time until applications like mobile TV become mass market, for example.

But the difference between 2000 and 2005 is that we have reached a point where several key drivers of mobile data are coming together. Users typically have handsets with colour screens and better data capabilities. 3G networks are becoming widespread. And, importantly, the creative community – the media and music industries – are beginning to make a serious play for the mobile platform, rather than just having one or two people engaging in limited activity in mobile, which used to be the case.

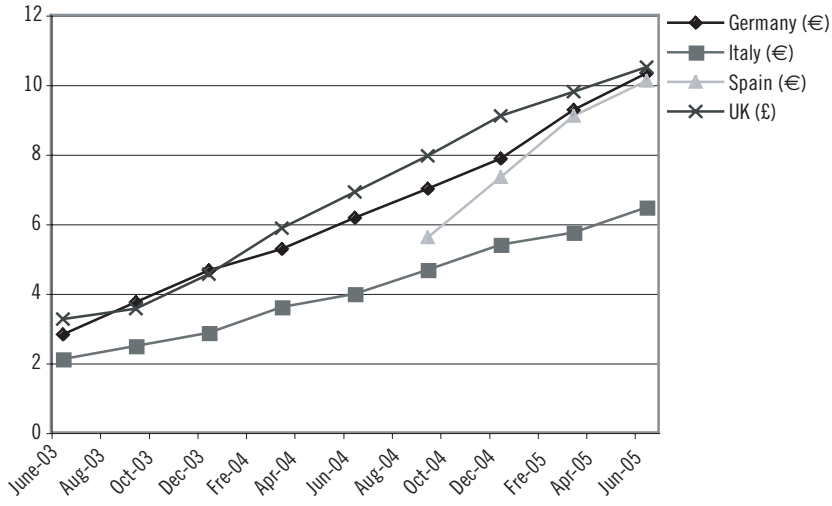
Q: What are the key trends in the mobile content and applications market?

Jessica Sandin: By far the most noteworthy is an ever-more widespread change in operator strategies around their own portals and content offers.

Operator strategies have taken several turns since content became an important part of the operator agenda, but the trend we're seeing now is quite significantly different. From investing substantially in their mobile content departments and offerings, many are now pulling back and there is a new focus on enabling brands and others to offer direct-to-consumer services.

This is clearly driven by a lack of ROI. The content on operator portals is not driving the kinds of revenues they've hoped for. I can't imagine that when cellcos first set their targets of a 25% share of revenues emanating from data, they'd planned for all but 1-2% to come from SMS. Anecdotally, we hear this was far from the case. Now operators are realizing that the idea of being more of a bitpipe, selling wholesale data in various forms – or even hosting MVNOs – is not such a bad business to be in after all.

Figure 1: Vodafone rolling nonmessaging data ARPU, Jun-03–Jun-05



Notes: Calculated by multiplying nonmessaging data revenues' share of service revenues with rolling ARPU. Dates indicate 12 months to end of month. € 1=US£1.24. £1=US$1.79

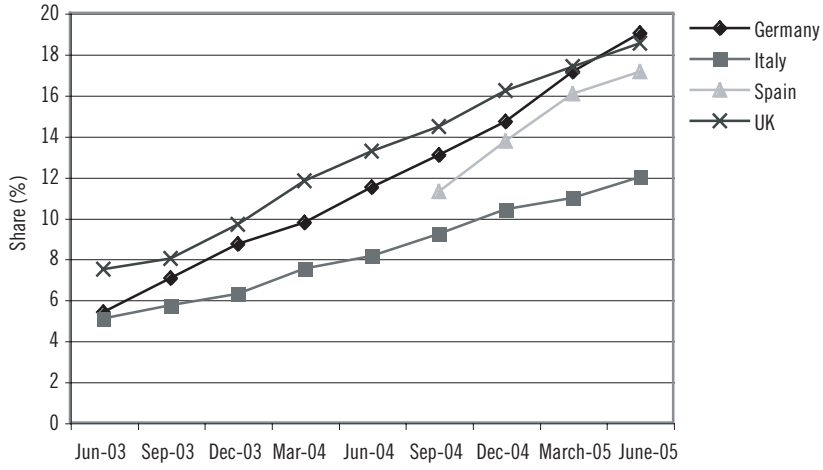
Source: Vodafone, Mobile Media

For second-tier operators, the cost-vs-return of running a portal typically doesn't stack up. Already we're seeing increased outsourcing and this trend is likely to continue.

But it's not just the small cellcos that are going down this route. Content and portal teams in technology-oriented telecoms organisations were always an uneasy fit. Most cellcos' data and content departments have undergone multiple reorganizations in a relatively short space of time and now many are looking to leave the content – or at least a significant part of it – to external partners. This is evident in O_2's adoption of i-mode – which is essentially a business model for enabling third parties to offer content to your subscribers – and T-Mobile's move to "Webn'n' walk" and its partnership with Google. Neither O_2 nor T-mobile executives sound very convincing when they say there'll be continued investment in O_2 Active or T-zones.

This is, furthermore, not only about a better business model for content. The mobile phone is an intensely personal device, and there's no way an operator can provide content for each individual taste on their portals.

Figure 2: Vodafone nonmessaging share of total data revenues, Jun-03–Jun-05



Notes: Dates indicate 12 months to end of month

Sources: Vodafone, Mobile Media

Vodafone – whose live! service was in some ways more closed than both t-zones and Active (the only way to get outside the portal was to use WAP Push or to input URLs to bookmark) – is now increasingly vocal about enabling a direct-to-consumer universe. The cellco has said it plans to put a range of enablers in place. There's been limited action so far, but we should see this strategy developing in coming weeks and months. This also points to the next hurdle in mobile data – putting all the right enablers and the business models in place to enable D2C effectively. But at least, by taking the D2C enabler route, operators will be able to play to their traditional strengths.

All this movement from operators is now being coupled with content-owners' increasing interest in mobile and their interest in offering content direct to the user, irrespective of that user's mobile network. What you get is an industry moving towards an environment where brands and others offer online mobile data services direct-to-consumer. The operators must ensure they provide both the right enablers to guarantee a good user experience and the billing enablers that mean content owners don't use other payment mechanisms.

Operators must also enable the D2C content providers to offer transparent pricing cross-network. That's easier said than done in Europe, where there aren't a lot of flat rate data plans. Wholesale of MB of data may be the answer. It is likely that some cellcos, at least, will continue holding on to some core services – mobile TV or mobile music or sports – at least initially. Whether this continues will depend on how well these services do, or how valuable they are as differentiators.

Q: Are there no exceptions to this D2C drive – are any operators going down the media route?

Jessica Sandin: They're certainly not becoming film-makers or record producers, but there are operators that remain more focused on providing their own content line-ups in the way that a satellite TV provider would. The noteworthy factor here is that the most viable plans are focused on content through convergence.

France Telecom is the most obvious example of this strategy. It is looking to generate €400 million by 2008 purely from content revenues – but this is across its fixed, mobile and Internet networks. For example, its cross-network, strategic partnership with Warner Music Group yielded a deal in October in France around a new album from Madonna, which saw especially created ringtones, videos and full-track pre-releases available across the Orange mobile and Wanadoo Internet networks.

France Telecom has ramped up its cross-platform content team, looking to provide the kind of cross-network subscription services many expect that consumers will want. Whether France Telecom has the right brands to do this – especially outside France – remains to be seen, but it's nevertheless an interesting development. The potential need to offer converged content services also puts into question the perceived dominance of Vodafone in this space. If it was to continue pursuing live!, it may see itself sidelined by its lack of fixed – Wi-Fi or cabled – Internet assets. Even the wireless content world is rapidly becoming so much more than 3G.

But for those pursuing this kind of cross-platform content strategy over their own networks, it's equally important to ensure that it's not to the exclusion of other content providers. If I was an Orange mobile customer and preferred to access an Internet portal other than Wanadoo over Orange's mobile network and get my cross-platform content through them, I should be able to do that – otherwise each part of the cross-platform offer may ultimately lose out.

Q: And what about content MVNOs? What are their prospects?

Jessica Sandin: I think any content-focused MVNO has to make sure it's got its cost structure right and that it is backed by the right brand and positioning. In reality, there aren't that many brands that are able to make a play in the MVNO market based on content and lifestyle. Either you still have to include the 'cheap communication' focus that many MNVOs have had so far, or the brand has to attract fans that are completely immersed in that brand's values and trust the brand to come up with the right content experience. If not, it may just make more sense to offer D2C services through a range of operators and leave the voice communication to the established cellcos.

Q: What kinds of business models can we expect for mobile content? Will users be expected to pay for everything or is advertising making a comeback, too?

Jessica Sandin: The industry has long insisted that users will pay for mobility. But I think there are limits to that, and yes, a re-emergence of interest in advertising business models for content goes hand-in-hand with the renewed interest in mobile media services.

Many FMCG brands are sniffing around the mobile content space – beyond the 'Text'n'win' type marketing campaigns. Many operators are still cautious about featuring advertising on their portals, and for some brands the reach of the mobile web is not great enough yet. However, advertising will be part of any media channel and, once mobile media becomes more prominent, sponsors and advertisers will increase their spend on mobile, too. Some operators are already selling advertising inventory on their portals, while many others evaluate advertising models, through search, sponsorship or more straightforward ads.

Q: What types of content and applications work well on mobile today?

Jessica Sandin: The big revenues are still coming from personalization – ringtones and wallpapers – rather than content consumed on the phone. Currently, it seems like mobile content still needs to be driven by brands and events outside the phone. So, content linked to popular TV series, for example, has a greater chance of succeeding.

Unfortunately we're not yet seeing an awful lot of truly innovative services that really take advantage of the capabilities of a mobile phone. We've got some 'made for mobile' TV series that are nothing more than a rehash of the TV format in 1-2-minute chunks, for example. It would be great to see some more true creativity. I think it will come, though – the mobile gaming industry, for example, has moved from focusing on console-games ports (although these are still around too) to looking at 'casual gaming', with one company, i-Play, pioneering the 'one-thumb gaming' concept which is much more suitable for a mobile phone. The games sector was also early to embrace the idea of communities. Even if some of the features deployed were very simple, such as high-score upload, this has proven successful.

We're expecting many more mobile content categories to embrace the idea of communities in the near future, and an increasing number of operators are looking at how to enable such features across their networks. Community features are a natural add-on for mobile content, since they draw on what the mobile phone does best – communication.

Q: What mobile entertainment services will generate the most revenues going forward?

Jessica Sandin: We've forecast that by 2010, audio-based music services will still dominate the global mobile entertainment market, but ring tones will be commanding a less dominant share of that as the market expands to encompass widespread mobile media consumption

rather than only personalization. This is followed by games and video (see Figure 3) – note though, that these forecasts don't include mobile broadcast services.

Figure 3: Global mobile entertainment revenues, 2005-2010 (US$ mil.)

	2005	2006	2007	2008	2009	2010
Music	5,539	6,819	8,261	9,623	10,529	11,338
Games	2,381	4,018	5,686	7,310	8,886	10,172
Gambling	1,157	2,135	3,398	4,986	6,385	7,624
Video	1,450	2,517	3,755	4,987	6,085	6,927
Personalisation	4,315	4,647	4,764	4,704	4,550	4,399
Adult	974	1,255	1,587	1,892	2,149	2,349
Total	**15,816**	**21,392**	**27,452**	**33,501**	**38,584**	**42,809**

Source: Informa Telecoms & Media "Mobile Entertainment" (Sept. 2005)

Q: What about the mobile-content and application-specific companies? What is happening in that part of the industry?

Jessica Sandin: More and more consolidation. We were already talking about this trend last year, and now there's fewer and fewer important companies left to acquire. Many are looking to expand their area of activity in order to offer complete end-to-end solutions – be it a full range of mobile content and services around a particular brand or end-to-end solutions for operators.

Lately, we've seen Motricity take over community specialist M7 Networks and payment provider Valista, while European ASP Buongiorno Vitaminic also acquired community capabilities by buying French provider Freever. Openwave bought French mobile music ASP Musiwave this autumn and others are also eyeing mobile music providers. There aren't that many startup companies left to take over that are focused on mobile music – Groove Mobile and Melodeo are two – but Japanese companies continue to be important acquirers – Cybird strengthened its hand in North America by buying Airborne Entertainment, for example, while Index and For-Side both by now have relatively considerable international assets.

Jessica Sandin is a Principal Analyst

Jessica is principal analyst for mobile content. She is one of Europe's foremost authorities, and has tracked the mobile data industry on a daily basis since 2000. Jessica is an engaging and respected speaker at industry conferences.

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MVNOs – wholesale and retail separation

Several years ago, the first wave of MVNO hype came and went. Now, once more, there is a lot of activity in the MVNO space as media companies attempt to exploit their brands and the Internet produces a host of discount operators. Here, ***Mark Newman*** *identifies the different types of MVNOs that are emerging, looks at their long term business strategies and says that operators need to develop wholesale businesses to support MVNOs.*

Q: Do you think that the MVNO concept is here to stay?

Mark Newman: I think you're seeing two types of MVNOs emerging – those with business plans based on offering cheap voice and SMS on the one hand, and companies that are trying to target new markets with new services on the other. The cheap voice concept is largely a European phenomenon which started with companies like Telmore in Denmark offering an online SIM-based service with no handset. These are springing up all over Europe now but I believe that this is a short term phenomenon. They have exploited the failure of operators to reward those customers who have served out their contract period but do not want to upgrade to a new phone. This arbitrage opportunity will inevitably disappear and we are already seeing operators buying up successful MVNOs. Meanwhile players such as E-Plus in Germany are launching their own arms-length MVNO operations. On the other hand, MVNOs which offer operators something new – such as reach into a new market or new content and service concepts – have a much better than of long term success.

Q: What examples do you have of MVNOs who have viable long-term strategies?

Mark Newman: A few come to mind. In the UK there's a company called Extreme Mobile which Vodafone has recently taken on board as a youth-market MVNO. This is Vodafone's only MVNO deal – in Ireland for example Vodafone is fighting tooth and nail to stop the regulator from forcing operators to open up their networks to MVNOs. In the U.S. we're seeing content companies such as ESPN and Disney dip their toes in the water by entering the mobile sector as MVNOs. I think in the long term they see their MVNO businesses as another channel for their content. For these players, the handset will be part of the whole mobile experience that they deliver.

Q: Should operators be actively looking to develop wholesale businesses to support MVNOs?

Mark Newman: Absolutely – and a number already are. If you look at Danish operator TDC, it has developed a very successful MVNO business. When Telmore first launched its online SIM-card service in 2000 many observers thought TDC was crazy to offer Telmore such a low wholesale rate that it could compete effectively against TDC's own retail operations. Remember, TDC was the incumbent operator with the largest market share so, arguably, it had the most to lose – in terms of churning customers – from an upstart MVNO operation. But as it turned out, Telmore ended up causing most damage to the two smallest players in the market, Telia Denmark and Orange. Orange was actually forced to quit the market altogether. And then last year, TDC acquired Telmore to stop anyone else – for example, a rival operator – from taking its customers and switching them onto another network. Interestingly, TDC now says that the lifetime profitability of its wholesale customers is greater than that of its retail customers.

Figure 1: MVNO subs in Denmark, Germany and the UK

Operator	Partner network	Dec-03	Mar-04	Jun-04	Sep-04	Dec-04	Mar-05
Denmark							
CBB Mobil	Sonofon	192	206	184	185	190	194
debitel Denmark	TDC Mobil	328	326	303	291	278	267
Tele2 A/S	Sonofon	56	65	109	124	122	134
Telmore A/S	TDC Mobil	454	483	503	510	515	522
Total MVNO subs (000)		**1,029**	**1,080**	**1,099**	**1,110**	**1,105**	**1,116**
MVNO subs as a % of total subs		**21**	**22**	**22**	**22**	**22**	**22**
Germany							
debitel AG	O2 Vodafone E-Plus	9,980	9,960	8,292	7,677	8,640	8,323
Drillisch	E-Plus Vodafone T-Mobile	1,559	1,727	1,794	1,760	1,626	1,675
MobilCom	T-Mobile Vodafone E-Plus O2	4,200	4,200	4,200	4,300	4,560	4,510
Talkline GmbH	E-Plus O2 Vodafone	2,091	2,150	2,281	2,454	2,590	2,709
Tchibo Mobilfunk	O2	N/A	N/A	N/A	N/A	146	252
Total MVNO subs (000)		**17,830**	**18,037**	**16,567**	**16,191**	**17,562**	**17,468**
MVNO subs as a % of total subs		**29**	**28**	**25**	**24**	**26**	**25**
UK							
BT Mobile	Vodafone	14	145	215	306	341	372
Carphone Warehouse	T-Mobil	119	119	120	110	120	125
One.Tel	Vodafone	71	219	270	224	81	84
Tesco Mobile	O2	12	160	341	430	500	650
Virgin Mobile	T-Mobile	3,600	3,962	3,390	3,604	3,880	4,032
Total MVNO subs (000)		**3,816**	**4,604**	**4,337**	**4,674**	**4,922**	**5,262**
MVNO subs as a % of total subs		**7**	**8**	**8**	**8**	**8**	**9**

Source: Informa Telecoms & Media

I actually believe that adopting a wholesale strategy is a great financial discipline for any operator. My hunch is that many operators out there today operate unprofitable retail businesses and strategies and by competing against other retail businesses they will be forced to put their houses in order. Furthermore, as operators seek out new markets and attempt to monetise their investment in 3G I think they're better off.

Q: Are there any other examples of MVNOs with successful wholesale strategies?

Mark Newman: Dutch operator Telfort is a very interesting case study. If you remember rightly Telfort was the subject of a management buy-out in 2003. At the time the company (which was then owned by O_2) was seemingly in a hopeless situation as the fifth and smallest operator in a market dominated by four of the big names in European mobile – KPN, Vodafone, T-Mobile and France Telecom. One of the first things that the new management of Telfort did was to separate out its wholesale and network businesses. The two only come together at CEO level. Telfort's wholesale strategy has been hugely successful – it now has one million 'MVNO' customers and 1.5 million direct customers. Telfort is now in the process of being acquired by KPN but Ton aan de Stegge, the company's CEO, told me recently that if the acquisition had not taken place, Telfort's strategy would have been to make it a wholesale-only operation.

Another great example is E-Plus (another KPN company). As the smallest operator in the German market, E-Plus came to the conclusion that it was just not viable financially to grow its share of the total German market with a more aggressive approach to pricing, handset subsidies and customer retention. Instead it has gone down the wholesale route spearheaded by Simyo, its own 90%-owned no-frills MVNO.

Q: So, will all operators end up going down the MVNO route?

Mark Newman: No, I don't think so. There are still plenty of operators, particularly those who are first or second-placed in a market, who see MVNOs as cannibalistic by nature. Look at Ireland where Vodafone (Eircell) and O_2 have resisted attempts by the regulator to prise open the MVNO market. It is principally the big mobile operator groups – Vodafone, O_2, T-Mobile (although the UK is an exception), France Telecom, Telefonica and TIM – who are standing firm and resisting the MVNO onslaught.

Q: Does 3G offer an opportunity for a new breed of MVNOs?

Mark Newman: Yes, absolutely. For the first time in a number of years operators have big empty networks that they will be looking to fill. They are fast coming to the realisation that they can't fill these networks just with the content on their own portal. Many operators are now pursuing off-portal strategies and I believe that this will be a more open-minded, enlightened approach to MVNOs. That said, I don't think operators really know how to price

wholesale capacity on their networks. Their retail 3G services are mostly over-priced and their wholesale prices will be based on these retail tariffs.

Q: Where does Virgin Mobile fit in?

Mark Newman: Virgin has never delivered the 'unique' services that it promised when it launched in the UK six years ago. Its success has really been based on a powerful youth brand and (in the UK) its strong presence in the retail sector. To be fair, this is probably because it has never had confidence in the networks or handsets to deliver compelling services. With the arrival of mobile music devices Virgin now has a real chance to exploit its strong positioning in this market. On the other hand, with players such as Motorola, Apple, Vodafone and Orange investing heavily in the mobile space there is a risk that Virgin could be squeezed out.

Q: So, five years from now, what will the MVNO landscape look like?

Mark Newman: This is a tricky one. I have heard it said that the mobile phone industry is going to end up looking like the credit card business. I'm not sure that I buy into this analogy because there is more potential for service differentiation between MVNOs than there is between credit card companies.

I can't see many of the no-frills service providers being around in five years time. Only those companies which offer exceptional customer service will survive and I think that even they will be acquired by the operators. What I can foresee is some of the leading entertainment and information companies – for example Sky or the BBC in the UK – becoming major players in the mobile content space and offering unlimited access to their programming for a monthly fee. But I would expect the mobile operators to bill for these services in which case they wouldn't really be MVNOs in the true sense of the word.

I think there's a chance that the U.S. market will evolve differently. If the likes of ESPN are successful I think we could see mobile operators handing over control of large chunks of the 3G market to some of the big names in entertainment and television. This would see their role being reduced to that of a pipe. That said, I think being a pipe could become an extremely good business if they get enough traffic on their networks.

Mark Newman is Chief Research Officer

Mark leads Informa Telecoms & Media's global research and business intelligence teams with responsibility for developing our thought leadership programme. Mark brings 17 years of experience in the telecoms and media research and publishing sectors and is a regular speaker and moderator at international conferences and regularly contributes to wider media.

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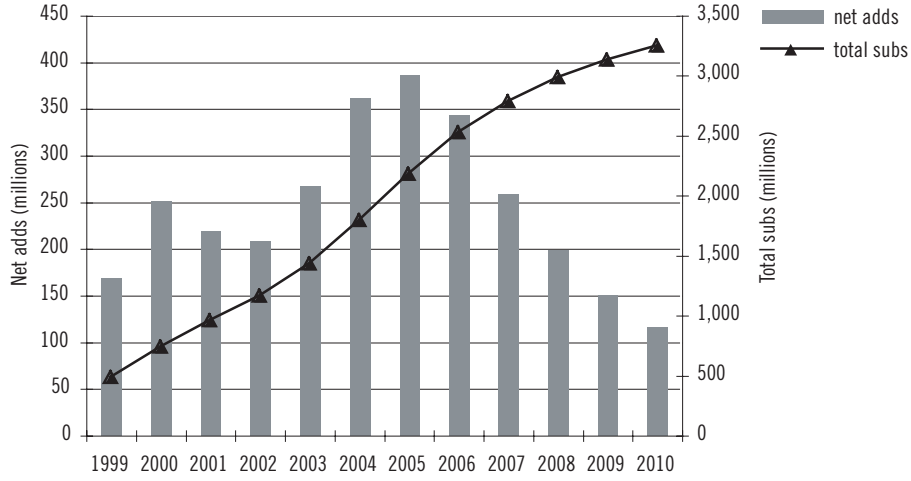
Top five growth markets in 2006

All eyes are on the developing markets to provide future mobile growth in the coming years, says ***Devine Kofiloto****. Out of the projected 343 million new global subscribers in 2006, 40% subscribers will come from the emerging markets such as China, India, Africa and Latin America.*

Q: Will we see a continued growth in overall net additions in the coming years

Devine Kofiloto: The continued growth in overall net additions is unlikely to be sustainable in the coming years, in spite of the phenomenal growth seen in many of the key developing markets such as China, Russia, Indonesia and India. As the growth in the developed markets slows down due to saturation and many developing markets begin moving towards maturity, the estimated net effect is that overall growth will start to decline. As such, though 2006 will see the global subscriber count increasing by 15.7% to 2.5 billion, net additions during that year are expected to drop by 11% to 343.1 million (see Figure 1).

Figure 1: Mobile subscription totals and forecasts



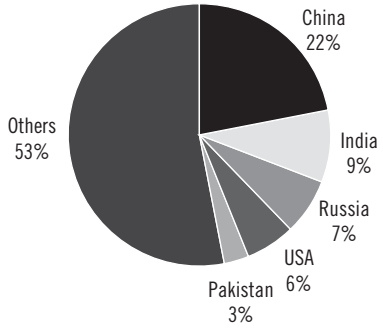
Source: Informa Telecoms & Media

Almost half of these net additions will be in Asia Pacific, with India and China alone accounting for 65% of the region's total. Other than Asia Pacific, Eastern Europe and Latin America are expected to show the greatest regional growth, with expected net additions of 44.8 million and 39.6 million respectively.

Q: Which top five markets will account for the highest growth in terms of subscriber net additions during 2006?

Devine Kofiloto: We expect five markets, notably China, India, Russia, the USA and Pakistan to account for 47% of the total net adds in 2006 (see Figure 2).

Figure 2: Net subscriber additions - 2006



Source: Informa Telecoms & Media

Not surprisingly, with the exception of the USA, the remaining four top growth markets in 2006 are in the lower income developing regions, which will drive subscriber growth over the coming years.

In the USA, wireless subscriber growth will continue to be driven by penetration of the prepaid segment. Currently accounting for 7-8% of the total subscriber base in the US, the prepaid market offers tremendous growth potential in the coming years. The continued influx of MVNOs and service providers targeting this potential growth segment is also serving as a catalyst for the incumbent operators to step up their efforts towards attracting new customers in this category. The increasing popularity of family plans, currently offered by all the four major carriers is also another significant factor driving net adds. Local number portability – introduced in November 2003 and now available nationwide – is also helping drive fixed line replacement as many consumers move their wireline numbers to wireless.

China alone will account for 47% million of the projected 160.7 million net adds in the Asia Pacific region in 2006. Recent investments in expansion of network coverage by operators, into the under developed Eastern provinces are now beginning to pay off. The declining price of handsets combined with an explosion in the number of local Chinese handset vendors has and will continue to impact competition; lowering affordability and helping drive subscriber acceleration in the market. Comparatively cheap in relation to competing cellular services such as GSM and CDMA, PHS services have taken up a large share of the low-end subscriber segment and are on course to surpass 87 million subscribers by 2005. Though we are seeing signs of China Telecom and China Unicom reducing spending on their PHS networks, further growth should see PHS subscriber totals reaching 105 million by end 2006.

The prepaid market will continue to drive subscriber growth in Russia, as the three main operators, Mobile TeleSystems (MTS), VimpelCom and MegaFon continue their expansion into the regions. With penetration levels in Moscow and St. Petersburg – the two major cities – exceeding 100%, operators are increasingly turning their priorities towards the outlying regions, where penetration still remains relatively low.

Though the issue of multiple SIM ownership is more prevalent in the developed markets of Western Europe, this phenomenon also appears to be on the increase in the Russian mobile market as operators aggressively push attractive promotion packages. Leading Russian operator, MTS, has admitted that as much as 20-30% of subscriptions in the country could be accounted for by secondary SIMs.

Pakistan's cellular subscription base has been growing at a rapid rate since mid-2004, with the country recording 21% growth in 1Q05 alone. The growth momentum is expected to continue through to 2006. Intense market competition has resulted in mobile tariffs decreasing by as much as 48% over the last year, with the average price per minute down to approximately PKR3.1 (US$0.05). The entrance of two new operators, Telenor and Warid Telecom, has and will continue to play a key role in stimulating further growth in this six-operator market. Telenor, which launched services in March 2005 as the fifth market entrant, acquired over 1.1 million subscribers after only six months in operation.

Q: Aren't services too expensive in many developing regions?

Devine Kofiloto: The cost of entry for new subscribers in developing regions such as Africa and Asia Pacific will be lowered by the uptake of ultra low cost handsets, which is being driven by the GSM Association's Emerging Market Handset initiative.

The consequence of the initiative will be to expand the size of the total addressable market in the key emerging markets. For instance, the growth surge in India, as with China and Pakistan, will largely be precipitated on the introduction of these new low end handsets. The commercial launch of the Motorola C115 in India, which retails at Rs2000 (US$45) and believed to be one of the cheapest handsets in the market, in May 2005 is reported to have helped boost Indian GSM operators' monthly net customer additions by one third to 1.6 million in June 2005.

The EMH initiative, coupled with the continuing lowering of the entry barrier for low end segments via the introduction of low starter pack denominations (starter pack as low as Rs99 [US$2.20]), is one of the factors fuelling growth and the expansion of network coverage into the non-urban areas, which is expanding the addressable size of the market.

Tata Teleservice, for example, plans to expand network coverage in Tamil Nadu from the present 1,400 cities to 2,500 cities by 2Q06, while Bharti has plans to roll out more than 10,000 base stations in 2006 alone. Further operator consolidation, with Hutchison's agreement to acquire BPL, should also encourage further investment to expand cellular coverage into the less urbanised areas.

Devine Kofiloto is a Principal Analyst

Devine heads up Informa Telecoms & Media's wireless research team, with particular expertise in mobile messaging, emerging markets and push-to-talk. Devine is a regular fixture on Informa's conference circuit, including the 3GSM World Congress.

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Section 1
Mobile strategies

ARPU and pricing trends

Over the past year, ***Shani Raja*** *has taken an in-depth look at the ARPU performance of mobile operators in about 20 western European countries. With the exception of a handful of cases, he says the most notable thing is that not much has changed.*

Q: Are multimedia services starting to have an impact on western European operators' ARPU?

Shani Raja: Not very much, it seems. Take the second quarter of 2005. Almost half of the operators in the region saw their average monthly ARPU drop very slightly compared with the same quarter in 2004 and also compared with the immediately preceding quarter, 1Q05, while most of the rest saw their ARPU hover around the same level, or rise only slightly.

What this suggests is that, across the board, mobile multimedia services aren't yet making an impact. Having said that, a couple of the "pure" 3G operators in the region are doing significantly better than the traditional operators – suggesting that 3G services at least have the potential to have a big ARPU impact.

3's units in Austria and the UK, for example, are among the highest scorers in the region – recording ARPU of €58.61 and €49.85 respectively in 2Q05, although in both cases ARPU has been on the decline over the past year. 3 Italy scored considerably less, €37.34, although this figure remains competitive compared with other operators in the region.

ARPU figures for 3 Sweden and 3 Denmark were not available, but it's worth remembering that they are both in markets where no-frills MVNOs have had a huge downward impact on mobile prices. Indeed, discount providers of this type could be playing a part in dragging down ARPU generally in a number of markets, by forcing operators to compete with their ultra-low-cost offers.

As more such companies enter the market, in places like Germany and France particularly, this pressure could increase and possibly offset ARPU gains from multimedia services. It's something we'll have to watch closely.

Q: Are there any clear ARPU leaders in western Europe?

Shani Raja: One useful way of looking at it is to divide the field into operators with ARPU of more than €40, and those with ARPU lower than €30. This gives us helpful indication of who are the leaders and stragglers.

In the over-€40 category we find: O_2 Ireland (€62.39), 3 Austria (€58.61), Swisscom (€53.70), Vodafone Ireland (€53.22), 3 UK (€49.85), Bouygues Telecom (€46.14) and Norway's NetCom (€43.09).

In the under-€30 category we find: all the German and Portuguese operators (ranging from €20.63 to €29.05), T-Mobile UK (€29.36), Italy's Wind (€19.62) and, lowest of all in our study, Tele2 Mobile of Sweden (€14.98).

The majority of operators tend to lie somewhere between these two extremes.

Q: Let's look at ARPU trends in specific countries. How is the UK performing?

Shani Raja: Of the UK's five mobile operators, three – Orange, O_2 and 3 UK – recorded lower average monthly ARPU in 2Q05 than in the first quarter of the year (see Figure 1). The biggest relative decline was suffered by 3 UK, which saw ARPU slip by almost €9 to €49.85. The year-on-year (yoy) decline was even steeper – in 2Q04 the operator's ARPU stood at a remarkable €64.73. 3 UK's chief executive, Bob Fuller, has attributed the recent drop to the growing number of prepaid users on the 3G operator's network.

Figure 1: Quarterly ARPU figures for UK (€) 2Q05

Operator	Blended ARPU 2Q04	Blended ARPU 3Q04	Blended ARPU 4Q04	Blended ARPU 1Q05	Blended ARPU 2Q05	Prepaid ARPU 2Q05	Postpaid ARPU 2Q05
O_2	36.12	36.37	35.75	36.24	33.74	16.30	64.54
Vodafone	40.09	40.36	38.65	38.02	38.03	15.59	77.16
T-Mobile	31.11	29.90	27.96	28.41	29.36	14.68	66.07
Orange	34.37	34.60	35.36	35.45	34.39	14.69	73.30
3 UK	64.73	57.80	57.80	58.65	49.85	n/a	n/a

Source: Informa Telecoms & Media

Despite the decline, 3 UK's ARPU is still much higher than any of its four domestic competitors', even though, unlike its rivals, the operator has yet to launch a dedicated business offering. Moreover, 3 UK's data ARPU is believed to remain some way ahead of its rivals' – at around 22% of total ARPU over the three months to the end of June 2005.

Vodafone maintained second position in the UK ARPU rankings, with a slight increase in the second quarter over the first. ARPU crept up from €38.02 to €38.03, but this was also some way down on the 2Q04 figure of €40.09. Vodafone does not supply data-ARPU figures, but the group's 2Q05 financial report showed that Vodafone UK's data revenues as a percentage of total service revenues had grown in each successive quarter since 1Q04 to reach 3.5% in 2Q05.

Orange overtook O_2 for the first time in at least a year in 2Q05 to take third place in the UK quarterly ARPU rankings. The operator recorded average monthly ARPU of €34.39, which was down on the first quarter's €35.45 figure but marginally up on its 2Q04 figure of €34.37.

O_2, meanwhile, saw ARPU decline from €36.12 in 2Q04 and €36.24 in 1Q05 to €33.74 in 2Q05.

T-Mobile, whose ARPU figures do not include MVNO Virgin Mobile's, remained at the bottom of the UK rankings. Its ARPU in 2Q05 came in at €29.36, which was better than its 1Q05 performance (€28.41) but considerably worse than its 2Q04 tally (€31.11).

It remains to be seen whether T-Mobile's launch this month of new business and consumer tariffs giving subscribers open access to the public internet will have any substantial impact on its ARPU performance in 3Q05.

Q: You mentioned that German operators' ARPU is relatively low compared with operators in other countries.

Shani Raja: That's right. All four German mobile operators recorded relatively low ARPU in 2Q05 compared with operators in western Europe's other large markets. In fact, none of Germany's operators managed to break above the Eur30 ARPU mark in the quarter, and all in fact experienced a slight drop compared with the preceding quarter. A termination-rate cut in December 2004 could have something to do with Germany's present low ARPU rates (see Figure 2).

Figure 2: Quarterly ARPU figures for Germany (€) 2Q05

Operator	Blended ARPU 2Q04	Blended ARPU 3Q04	Blended ARPU 4Q04	Blended ARPU 1Q05	Blended ARPU 2Q05	Prepaid ARPU 2Q05	Postpaid ARPU 2Q05
T-Mobile	23.08	23.92	23.45	25.14	24.12	9.43	39.85
Vodafone	25.52	25.91	25.75	25.54	25.52	10.05	41.69
E-Plus	24.08	23.92	24.85	22.19	22.03	6.30	37.76
O_2	28.96	29.41	34.25	29.79	29.24	11.00	44.00

Source: Informa Telecoms & Media

O_2 Germany led the pack in 2Q05, recording average monthly ARPU of €29.24, followed by Vodafone (€25.52), T-Mobile (€24.12) and E-Plus (€22.03). Only O_2 and T-Mobile managed to grow their ARPU year on year; Vodafone's ARPU remained steady from 2Q04 to 2Q05 while E-Plus's fell by almost €2.

E-Plus's ARPU decline could be further accelerated by its launch in 2Q05 of two low-priced, no-frills products, Base and Simyo, which are likely to attract more lower-spending users. E-Plus is believed to have introduced these tariffs in a bid to defend itself against the impact of the imminent arrival of a number of MVNOs in the German market.

Q: What explains Bouygues' impressive ARPU performance in France?

Shani Raja: That's interesting. Bouygues is France's smallest mobile operator in terms of subscribers, but its ARPU came in well ahead of its rivals in 2Q05 (see Figure 3). Following

the pattern of at least the previous four quarters, the operator recorded the highest ARPU in the market, €46.14, compared with Orange (€37.49) and SFR (€37.84).

Figure 3: Quarterly ARPU figures for France (€) 2Q05

Operator	Blended ARPU 2Q04	Blended ARPU 3Q04	Blended ARPU 4Q04	Blended ARPU 1Q05	Blended ARPU 2Q05	Prepaid ARPU 2Q05	Postpaid ARPU 2Q05
Orange France	32.36	32.39	33.91	39.16	37.49	16.08	51.30
SFR	36.46	36.29	37.27	39.26	37.84	n/a	n/a
Bouygues Telecom	42.96	39.76	39.76	46.14	46.14	n/a	n/a

Source: Informa Telecoms & Media

All France's mobile operators, however, demonstrated respectable year-on-year ARPU growth, with Orange having turned in a figure of €32.36, SFR €36.46 and Bouygues €42.96 in 2Q04.

Bouygues' strong performance is most likely linked to its i-mode mobile multimedia service, which had clocked up 1.23 million subscribers by the end of the second quarter. The operator is also thought to have recorded the highest percentage of data ARPU in the French market: according to Informa estimates, 9.5% of the operator's ARPU was made up of data revenue, ahead of SFR at 7.2% and Orange at 6.2%.

Q: Another large market is Italy – what's been happening there?

Shani Raja: Both Wind and TIM saw ARPU decline compared with the preceding quarter (see Figure 4). TIM's fall was only slight, from €30.71 to €30.57, but Wind's was dramatic – from €24.41 to €19.62. Vodafone's ARPU grew fractionally (from €31.77 to €31.84), while 3 Italy's stayed level at €37.34. However, like its UK counterpart, 3 Italy saw a steep drop from 2Q04, when its ARPU was €48.82.

Figure 4: Quarterly ARPU figures for Italy (€) 2Q05

Operator	Blended ARPU 2Q04	Blended ARPU 3Q04	Blended ARPU 4Q04	Blended ARPU 1Q05	Blended ARPU 2Q05	Prepaid ARPU 2Q05	Postpaid ARPU 2Q05
TIM	29.20	29.80	30.03	30.71	30.57	n/a	n/a
Vodafone	30.37	30.16	31.19	31.77	31.84	26.74	80.48
Wind	21.47	21.22	21.43	24.41	19.62	n/a	n/a
3 Italy	48.82	47.10	47.10	37.34	37.34	n/a	n/a

Source: Informa Telecoms & Media

In July, the 3G operator launched aggressive tariffs to lure subscribers away from the networks of TIM and Vodafone. If these attract many low-spending consumers, 3's ARPU could be further hit in subsequent quarters. However, 3 Italy did post strong non-voice ARPU of 26% for the period.

Q: How come Ireland's mobile operators have such high ARPU compared with the rest of Europe?

Shani Raja: Ireland's an interesting case. Irish operators' ARPU figures were second only to those in Switzerland, according to ComReg, the country's regulator: market leader Vodafone recorded a figure of €53.22 for 2Q05 and O_2's was even higher, €62.39. Third operator Meteor's figure was unavailable but is thought to be considerably lower than either of its rivals'.

According to ComReg, the country average for the quarter was €48, compared with the European average of €31. Vodafone's ARPU dropped from €55.38 in 1Q05 to €53.22 in 2Q05, but the latest quarter's ARPU was up substantially from the €49.42 reported in 2Q04. O_2's 2Q05 ARPU figure was higher than those recorded by the operator both in 1Q05 (€59.97) and in 2Q04 (€54.92). And both Vodafone and O_2 registered particularly high postpaid ARPU in 2Q05 – roughly €105 and €100, respectively.

The two operators have been criticised for charging too highly for mobile services. ComReg has been investigating allegations that the companies, which between them account for about 89% of mobile service revenues and subscribers in Ireland and 98% of all postpaid users, may be holding mobile prices at uncompetitive rates.

The coming months may well see ARPU declining somewhat, however, following the launch in July of 3 in Ireland. The 3G newcomer has vowed to launch aggressive offers aimed at "breaking the duopoly" of the country's two main operators.

Q: Swisscom's ARPU also seems impressive.

Shani Raja: Yes it is, but it's also been declining since the end of 2004: the operator's ARPU stood at €55.69 in 4Q04, fell to €54.34 in 1Q05 and slipped further to €53.70 in 2Q05. Swisscom suggests in its latest quarterly report that "cautious" consumer behaviour may have been the main reason for the decline, with average minutes per user slowing from 118 to 116 over the preceding 12 months.

Swisscom also cites the availability since March 2004 of an aggressive SMS offer, which includes unlimited texts for €3.20 per month. Although this has increased the volume of texts sent from its network, the operator says SMS revenues have correspondingly significantly declined.

Shani Raja is an Editorial Director

Shani has been writing about the mobile industry since 1998 and is frequently called on to write on the mobile industry for national/international newspapers, including the *Wall Street Journal Europe*. He has also written articles for the *Economist*, *Financial Times* and *Far Eastern Economic Review*.

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Roaming and alliances

Operators are focusing more and more attention on roaming services, says ***Paul Lambert****. This is demonstrated by the increasing number of roaming tariffs announced by operators, and the plethora of regional alliances that have been formed with one thing in mind – controlling roaming revenues.*

Q: How much importance do operators place on roaming?

Paul Lambert: Over the last four years or so, the issue of roaming and, more importantly, how much it costs, has become central to the strategies of most western European operators as they struggle to challenge Vodafone's ever-expanding footprint.

In Europe, the FreeMove alliance – born in 2004, and the StarMap alliance – launched in 2003, were formed to try to counter Vodafone's strength in offering users competitive roaming services, in particular to the enterprise market. In Asia, meanwhile, the Bridge Mobile Alliance and Asia Mobility Initiative were formed – in 2004 and 2003, respectively – to offer end-users compelling roaming services.

Q: How much revenue do operators generate from roaming?

Paul Lambert: Despite the importance of roaming to both end-users and operators, information about roaming is extremely difficult to come by. The reason is likely manifold, in part because the roaming agreements struck between operators are typically closely-guarded commercial secrets.

Moreover, regulators are increasing their investigative efforts into roaming, not least the European Union's Competition Commission, which launched headline-grabbing dawn raids on the offices of Vodafone and O_2 in the UK and Germany in July 2001, an event that has pushed information on roaming further into the shadows (see below).

While operators remain tight-lipped about how much of their revenue comes from roaming, Informa Telecoms & Media estimates that more than 26% of overall revenues are generated from roaming, with growth predicted to come from light and medium users, such as tourists, which could push the figure to about 30% by 2010.

According to *Global Mobile Roaming*, a report we published earlier this year, 12% of operators worldwide have roaming revenues that accounted for more than 26% of overall revenues, while 60% of operators have roaming revenues of less than 15% of overall revenues. Fifty-four percent of operators expect roaming revenues to be contributing upward of 16% to operator revenues in 2010, including 22% who saw it exceeding 26%.

Moreover, the number of mobile subscribers using roaming services will increase from 207.17 million at end-2004 to 852.37 million at end-2010 (see Figure 1) while revenues generated from international roaming will rise from US$75.58 billion at end-2004 to US$211.81 billion at end-2010, according to Informa Telecoms & Media.

Figure 1: Roamers per region 2004-10

Outbound Roamers		2004	2005	2006	2007	2008	2009	2010
North America		17.92	26.18	33.78	42.35	52.43	62.43	69.61
South America		10.33	15.10	19.48	24.42	30.23	36.00	40.14
Asia Pacific		36.06	54.29	72.19	93.59	119.85	147.73	170.59
	Japan	5.56	8.08	10.38	12.95	15.95	18.90	20.97
	China	10.03	15.45	21.01	28.01	36.87	46.69	55.35
	Korea	2.27	3.30	4.24	5.29	6.51	7.72	8.56
	India	1.58	2.43	3.30	4.36	5.69	7.14	8.38
	Rest Developed	10.25	15.50	20.68	26.81	34.32	42.26	48.73
	Rest Developing	6.37	9.53	12.60	16.18	20.52	25.03	28.58
Europe		131.68	193.21	250.33	314.64	390.38	465.84	520.39
Africa/Middle East		11.18	16.82	22.33	28.81	36.71	45.00	51.64
	Africa	5.69	8.52	11.26	14.46	18.34	22.37	25.55
	Middle East	5.49	8.30	11.07	14.35	18.37	22.62	26.09
Total		**207.17**	**305.61**	**398.11**	**503.81**	**629.60**	**756.99**	**852.37**

Source: Informa Telecoms & Media

Q: Do all regions equally contribute to roaming revenues?

Paul Lambert: Among global regions, Europe is key to roaming patterns, with large volumes of people travelling within Europe and to Europe. But increases in tourist arrivals in Asia Pacific are leading to a greater share of the roaming market there. The mobile roaming base in western Europe, North America and Japan is expected to peak and then slow after 2005, brought about by maturity and saturation in these markets.

The Asia Pacific, Africa and the Middle East mobile markets are expected to exhibit the fastest growth until the end of the decade – tripling their roaming customer bases within the five-year period to 2010. But, while the overall market growth is coming from the emerging markets, most growth in travel and thus roaming will still come from the mature developed markets of Europe and Asia Pacific, led by the regional and global alliance initiatives.

Q: Do certain mobile subscribers roam more than others?

Paul Lambert: Business travellers, especially GSM contract users, dominate the roaming market. Business travellers account for 40-60% of international travellers, varying by country and region, according to Informa Telecoms & Media. For instance, 41% of travellers to Honduras are business travellers, compared with 15% for Spain. Only 6% of outbound Spanish travellers in 2002 were on business.

Since the majority of roamers use the service while travelling on business, they are less price-sensitive than consumers. But as businesses become more price-sensitive with global MNC offerings, operators are expected to focus on encouraging more consumer roaming usage. The majority of mobile users are consumers.

Meanwhile, prepaid users are also important to operators looking to increase roaming revenues. The majority of mobile subscribers globally are on prepaid billing plans, and the number is expected to increase with growth in the emerging markets, which have 80-90% of all their customers on prepaid plans. But roaming functionality is still not ubiquitous across prepaid mobile services, as it is for contract users, with the result that only a limited segment of the global mobile base has access to roaming services.

Q: What's the status of investigations into roaming charges in Europe?

Paul Lambert: The highly publicized dawn raids on the offices of Vodafone and O_2 in Germany and the UK in July 2001 increased public awareness of the "excessive" pricing strategies and left operators with the daunting task of challenging the negative image of roaming. The EC said it could fine operators up to 10% of annual revenues if they are found in breach of EC competition laws and in April invited O_2 and Vodafone to give oral testimony as part of its investigation. The enquiry is currently processing these testimonies.

But in October, the EC went some way toward taking the roaming issue into its own hands by launching a website that makes public the roaming tariffs from the operators in all 25 EU Member States. At the launch of the website the EC said it had seen signs that competition is starting to develop in the area of roaming, in particular with some operators offering special holiday and other tariff packages.

Q: How have operators responded to the EU's close attention?

Paul Lambert: Despite the threat of punitive fines from the European Commission if operators are found to have charged excessively high roaming rates, Vodafone, O_2 and T-Mobile each insist that their moves to reduce roaming tariffs were based solely on commercial pressure and are not part of a plan to avoid hefty fines.

While the operators unanimously agree that transparency is needed to drive adoption, global roaming charges are still extremely complex and in most cases difficult for users to view and understand.

In June, Vodafone announced the launch of its Passport service, which is designed to provide consumers with pricing transparency by charging a flat rate of £0.75 (US$1.33) per call and then the standard UK rate per minute or nothing at all if the user has inclusive or voice-pack minutes. The tariff, available in France, Spain, Italy and Portugal, enables a subscriber on Vodafone's Anytime 200 package to make a five-minute call from Spain to the UK for just

£0.75, as opposed to £3.75 under the previous Vodafone World rates. Vodafone expects to balance out the fall in roaming revenues by increasing usage.

Vodafone's single-entity approach simplifies the process of introducing flat-rate fees, enabling the operator to make changes much more quickly than the cumbersome multiple-member alliances can. Reports of in-house spats between T-Mobile and Orange in the FreeMove alliance over who will run networks in the UK, where both operate, seem to confirm this thought.

Q: What about roaming offerings from the alliances?

Paul Lambert: FreeMove, arguably the strongest alliance and strongest contender against the might of Vodafone, has made some advances in establishing a common prepaid top-up service, and its members have emphasized the importance of creating transparent pricing structures.

But in 2Q05, the alliance had made no major announcements and its operator members still charged customers significantly higher rates than Vodafone did. T-Mobile of Germany, Orange of France, Spain's Telefonica Moviles and Italy's TIM – the four founding members of FreeMove, which was established in April 2003 – still charge independent roaming rates and have not established a flat-rate fee for consumers.

FreeMove's existing service, launched at end-2004, is aimed at multinational companies and uses a zoning structure to provide a standard charge within each zone, regardless of which network the user roams to. But from a consumer perspective, the alliance has had little impact.

While Vodafone charges its GRPS customers roaming on its German network £5.80 (US$10.17) per megabyte, T-Mobile customers in the UK must pay £7.50 (US$13.15) per megabyte and Orange customers in Germany must pay £10 (US$17.53) per megabyte. But an Orange spokesman insisted that a multiple-operator approach is the way forward, enabling Orange to "improve its competitive positioning through the exploitation of synergies and economies of scale."

UK operator O_2, a member of the StarMap alliance, along with 10 Tier 2 and Tier 3 operators including Telenor of Norway, has failed to reduce roaming tariffs at all, and the operator does not even mention the alliance in its roaming literature. O_2 offers roaming tariffs across six regional geographic zones, with complex add-on options for reducing call prices. A standard voice call from Germany to the UK as of May costs £0.99 (US$1.74) a minute, plus a standard connection fee. O_2 refused to comment on why the alliance had yet to implement a flat-rate fee, with analysts pointing to the difficulty of finding pricing structures to suit all 11 members.

Although FreeMove has not announced any definitive pricing structures, the group's initial focus was on seamless roaming between networks, an aim that in many degrees it has

achieved. However, analysts say that, without a transparent pricing structure, the operators will fail to generate the types of revenues they had hoped for.

The alliance has a new issue on its hands now that Orange's parent company, the heavily indebted France Telecom, has acquired Spanish incumbent Auna. The operator purchased an 80% share in the fixed-line operator for US$7.7 billion at end-July, giving it control of third-placed mobile operator Amena, of which Auna owns 97.9%.

Meanwhile, StarMap has failed to make any inroads into reducing prices, with its 11 operators offering roaming in 11 countries to a much smaller managed subscriber base of 54 million. The group's focus seems to be on developing agreements with vendors in order to use its bargaining power to purchase cheaper handsets, which is surprising considering the EC's probe into the roaming charges of the group's only significant operator, O_2.

Q: Are regulators outside Europe as focussed on regulating roaming?

Paul Lambert: Yes. The U.S. regulator, the Federal Communications Commission, said in August it plans to examine whether carriers' roaming obligations need to be modified, expanded or eliminated after a wave of merger-and-acquisition activity in the past year that has given rise to possibly anticompetitive roaming agreements. The FCC says it will consider whether to mandate that nationwide wireless carriers provide automatic roaming for subscribers of small and rural carriers.

The move is in response to Alltel's July acquisition of Western Wireless, which raised fears that small carriers have been prejudiced in striking roaming deals by consolidation among U.S. operators.

The FCC will look into whether carriers should be required to enter into agreements to allow automatic roaming on their networks and at possible evidence that national carriers are negotiating roaming agreements with small or rural carriers in an anticompetitive manner. It will also seek comment on manual roaming, as well as on what effect the existing roaming environment has on the availability, quality and price of services.

Q: How successful have the Asian roaming alliances been to date?

Paul Lambert: Telekom Malaysia Group's joining of the Asian Mobility Initiative in June bumps up the AMI's profile as a pan-Asian alliance and puts it on a more equal footing with the Singapore Telecom-led Bridge Mobile Alliance.

AMI was formed in 2003 and its members include Australia's Telstra, Macau's CTM, the Philippines' Smart Communications, Singapore's MobileOne, Thailand's TAC and now the TM Group, which includes Celcom in Malaysia and TM International, which owns stakes in eight regional cellcos. TM Group's addition to AMI increased its subs base by almost 13 million – to 50.9 million – at end-March.

BMA, formed in November, basically consists of SingTel and its subsidiaries – Australia's SingTel Optus, India's Airtel, Indonesia's Telkomsel and the Philippines' Globe Telecom (the exception is AIS in Thailand) – alongside Hong Kong's CSL, Malaysia's Maxis Communications and Taiwan Mobile.

AMI has launched a flat-rate roaming service, AsiaConnect, and plans to initiate preferred roaming deals. AMI operators are discussing the joint procurement of handsets and aim to work together to acquire content and develop services for business travellers.

BMA unveiled its first services – including seamless GPRS and MMS roaming and a common prepaid-roaming top-up service – for member operators at the recent CommunicAsia conference in June.

Bridge, having acquired a prepaid-roaming platform, has discussed the possibility of acquiring a push-to-talk platform. SingTel has also said that one of the alliance's key goals is joint procurement of handsets and network equipment at lower cost.

CSL and Maxis were originally part of AMI but defected to BMA, which is initially signing up only one operator per country.

BMA is now only slightly larger than AMI, with its members having 58.3 million customers among them. Its goals are similar to AMI's, including jointly procuring handsets and seamless roaming. A key difference is that each BMA members has put in US$1.5 million, and the figure could rise as high as US$4 million apiece.

In short, most of Asia Pacific's leading operators are part of an alliance, are aligned with a global operator, or both.

Paul Lambert is an Editor

Paul Lambert is the editor of *Global Mobile*. Paul has been covering the wireless industry with Informa Telecoms & Media for five years. He has worked across a variety of news publications, including *Global Mobile Daily* and *3G Mobile*, and was the launch editor for *Eastern Europe Wireless Analyst*. Paul has also contributed to analyst reports, providing an in-depth view of the trends and issues that shape the wireless industry.

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Churn and customer care

Minimising churn should form a core strand in an operator's strategy to increase its profitability. While this may have been addressed in some of the more mature markets of the world, operators in emerging markets – where liberalisation may only recently have occurred – are having to face competition for the first time. Here, ***Kris Szaniawski*** *looks at the impact next generation services will have on customer care, the importance of QoS and whether self-service is the way forward.*

Q: What impact will next generation services have on customer care?

Kris Szaniawski: There is no doubt that the growing complexity of services will impact on the type of customer support being provided by operators. Traditionally the bulk of enquiries being handled by service providers' customer service centres have been billing-related, whether dealing with invoicing errors or balance requests. But as operators roll out services ever-faster, and as services and handsets become more complex, customers will increasingly require more sophisticated levels of technical support that are more akin to those offered by computer suppliers. This will require increased investment in online resources and customer service agent training.

Q: How important is quality of service?

Kris Szaniawski: The factors influencing retention change with the level of market maturity. Initially, factors like coverage are the most important, then – when all the networks achieve good coverage – competition switches to price, and when everyone starts offering low prices, attention switches to customer service, quality and SLAs. Also, as services become more sophisticated, QoS becomes much more important. With a dropped voice call most people just redial, but the situation changes dramatically if you download some music and get billed for it but the file is corrupted. It is likely that it will only take a couple of experiences like this for a customer to decide to switch to another operator offering an SLA policy and good customer care. Operators have so far been slow to respond but there is increasing pressure, from business customers in particular, demanding formal and structured SLAs. Pressure is also building from third party content and application providers – unless an operator can guarantee them a safe, high-quality route to market they will be unlikely to partner with them.

Q: Can customer service be a differentiator?

Kris Szaniawski: Some take the growing importance of customer service to the logical extreme and argue that customer experience will become important enough to serve as the key

differentiator between service providers. It seems unlikely that this will apply across the board, but with certain services and in certain segments this will undoubtedly be the case. There are categories of business users and top tier customers that will be prepared to pay a premium for better quality customer service, which will make it worthwhile for the service provider to invest in the software and trained personnel to maintain those service levels.

On the other hand offering high levels of customer service for bottom tier customers could be counterproductive. This is not to say that quality of service is unimportant in a low cost environment - even low cost customers will churn if service support drops below a certain level – but certain categories of operator such as discount MVNOs will have less to gain from investing heavily in customer services.

Q: Is customer self-service the way forward?

Kris Szaniawski: An increasing number of telecoms operators are looking to turn self-service technology into a central plank of their customer-care strategy. Although the telecoms industry is often criticised for lagging behind in the area of customer care, in fact it is turning into an early adopter of self-service technologies, with only the banking industry faster off the mark.

It's understandable that operators might want to reduce expensive customer/operator interactions – a typical call to a customer service centres can cost around US$10 to handle. But what is interesting is that we are seeing an increasingly positive response from customers. We've seen a number of surveys this year suggesting growing public acceptance of self-service. In some markets a majority of mobile users say they would now prefer to manage their accounts online or through their handset.

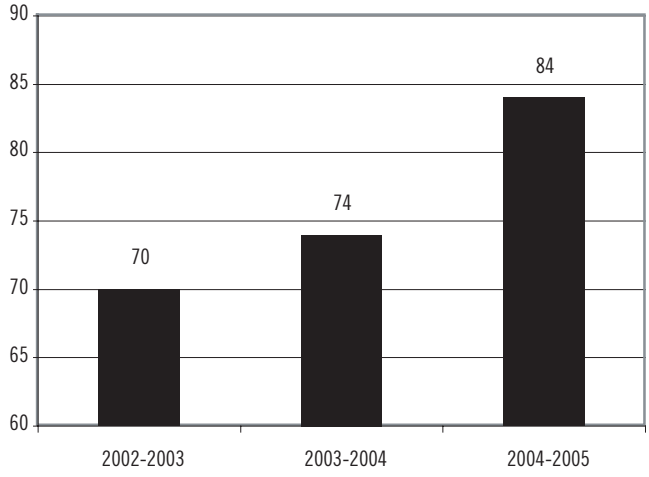
But operators need to tread carefully as customer reactions to self-service are not clear cut. For example interactive voice response (IVR) still appears to be as unpopular as ever, even though mobile customers appear to be more accepting than most. Reactions also differ widely from segment to segment. Not surprisingly, younger adults demonstrate a stronger preference for online self-service with older consumers far more likely to be dissatisfied with or unwilling to use it.

Geographical differences are also considerable. For example, North American contact centres generally lead the way in implementing the most-advanced self-service solutions, while the Asia Pacific region –Australia in particular - leads the way in deploying online self-service capabilities. By contrast, some European markets demonstrate a clear reluctance to give up personalised human services, and where self-service has been implemented, it is cost saving rather than customer satisfaction that has been the main driver.

Q: Is there a role for CRM?

Kris Szaniawski: CRM software may still be recovering from the bad press it received from a spate of overambitious and failed CRM projects a few years back, but operator spending is once again on the up. According to Informa Telecoms & Media data the number of CRM contract and implementation announcements in the telecoms sector has consistently grown over the last two years.

Figure 1: CRM contract announcements



Source: Informa Telecoms & Media

Telecoms-vertical specific CRM solutions provider Amdocs continues to dominate the telecoms sector but the big horizontal vendors are keen to target their products better at the telecoms sector.

Oracle's purchase of Peoplesoft and Siebel is intended not just to give it critical mass in the CRM space but to also sidestep the pain of integrating different systems within the customer environment, avoiding the "integration" that has traditionally formed part of the deployment of applications such as CRM. However, it is unclear how possible it will be to create a single suite of integrated applications as operators' back-office systems have to interoperate with a wide variety of other systems. They are both specialised and fragmented, with billing, call-logging, sales and web functions all standing in isolation and fed by data extracted from contributing systems.

Hosted CRM providers such as Salesforce.com – which counts Vodafone and Orange amongst its customers – argue that the traditional in-house approach to CRM is becoming obsolete. Customisable on-demand CRM is perceived by some as a way to ease the pain of integration that even on-demand CRM has to be integrated into the back and front offices. The big horizontal CRM vendors obviously don't go along with this interpretation – in the

wake of its recent acquisitions Oracle's president was reported in the press as saying that the company could "crush" Salesforce.com.

Another trend is the branching out by traditional CRM vendors into adjoining areas such as predictive analytics. For example, earlier this year Amdocs established a partnership with business intelligence (BI) software provider SAS. The last year or more has seen an increasing focus on applying customer analytics to CRM – Siebel, PeopleSoft and SAP have all announced either new strategies to add customer analytic applications to CRM or enhancements to existing offerings.

Customer and business intelligence have become increasingly interesting as effective user segmentation and information have become a priority for mobile operators. Operators have realized that they really need to understand their customers and how valuable they are. Multiple services and bundled offerings mean that operators increasingly require not just demographic information but also business intelligence and analytics to provide the context in which services are being used and the value of individual customers. Customisation, personalisation and customer segmentation are impossible without adequate software delivering the required information and analysis.

Another area operators have shown an increasing interest in is customer experience management (CEM) solutions offered by companies such as AranTech and Olista, which aim to track and solve service delivery problems. These vendors claim that CEM solutions bridge the gap between the customer's experience and what traditional network and service-management systems can measure and manage, which is a pretty useful function as operators and content providers are often totally unaware how often data users simply can't even get a service to work. Integrated CEM/CRM solutions could provide a useful differentiator for operators.

Kris Szaniawski is a Principal Analyst

Kris is a principal analyst and an expert in billing and customer care. With over 10 years experience in the communications industry, Kris has previously written for both trade and national publications, including Mobile Communications International, Financial Times and The Guardian.

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Section 2

Mobile markets

Asia Pacific

At over 750 million subscribers, the Asia Pacific region accounts for nearly 40% of the global mobile subscriber base and over 30% of the world's subscriber growth year-on-year. By the end of 2006 one billion mobile subscribers will live within Asia Pacific. The region contains a diverse range of mobile markets at different levels of development in terms of subscriber growth and advanced data usage. Here ***Liz Hall*** *and* ***Nicole McCormick*** *discuss the latest developments in terms of subscriber growth and 3G uptake and network rollouts across Asia.*

Q: What are the main markets leading subscriber growth in Asia Pacific?

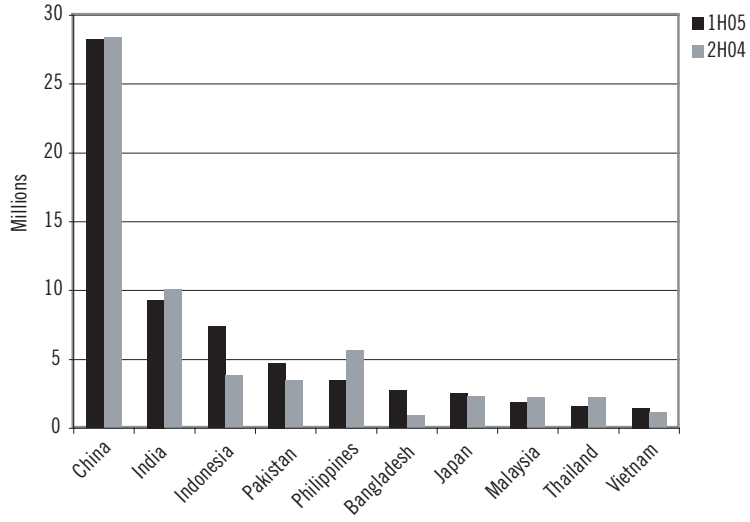
Liz Hall: The two most populous countries in the region, China and India continue to account for well over 50% of the subscriber growth within Asia Pacific. However these markets share of the region's subscriber growth is falling year-on-year as other mobile markets such as Indonesia, Pakistan and Bangladesh begin to gain momentum.

China continues to lead the Asia Pacific pack adding over 28 million new subscribers during the first half of 2005, compared with second placed India's nine million additional subscribers over the same period. In Pakistan, the effects of new entrants Telenor and Warid Telecom have had an immediate impact on the mobile market which recorded a 60% increase in the subscriber base during the first six months of 2005.

Indonesia suddenly sprang into action in 2005, adding over 5.5 million active subscribers in 2Q05 (see Figure 1), compared with less than 2 million net additions in each of the previous two quarters. Indosat and Telkomsel's investments in network coverage and capacity now appear to be reaping in the rewards. With the entry of Maxis Communications and Telekom Malaysia into the market, via investments in Lippo Telecom and Excelcom respectively, increased competition in the world's fourth most populous country is expected to propel the market to over 45 million subscribers by the end of 2006.

The acquisition of Sheba Telecom by Egyptian operator Orascom at the end of 2004 has raised the competition stakes in the Banglaseshi market with Telenor's GrameenPhone moving to protect its market share. Bangladesh achieved a 190% increase in subscriber additions during 1H05 compared with 2H04, achieving 6.5 million subscribers at the end of 1H05. This growth was helped by Sheba Telecom's subscriber clean-up in 4Q04 and the introduction of prepaid services in February 2005. However, the main driver of subscriber growth has been GrameenPhone, which reported a 55% increase in its subscriber numbers from 2.4 million to 3.7 million in 1H05. Bangladesh's strong subscriber growth is forecast to continue as Sheba and GrameenPhone battle it out for market share with Informa Telecom's & Media forecasting that a country subscriber total of over 16 million will be achieved by the end of 2006.

Figure 1: Asia Pacific's fastest growing subscriber markets (June 2004 to June 2005)



Source: Informa Telecoms & Media

Q: Is WCDMA penetration gaining ground in the region?

Liz Hall: Japan stands out as the only market in Asia Pacific where WCDMA is significantly gaining market share with over 15 million subscribers by mid-2005. Both NTT DoCoMo and Vodafone are actively encouraging subscriber migration to WCDMA through attractive handset offerings and competitive tariffs. Informa Telecoms & Media forecasts 38 million WCDMA subscribers in Japan by the end of 2006 which represents a 40% share of all mobile subscribers in the country.

Elsewhere growth of WCDMA has been markedly slow with the majority of uptake in the region's next biggest WCDMA markets, Australia and Hong Kong, being driven by Hutchison 3's aggressive subscriber acquisition strategy. Japan, followed by Australia and Hong Kong will continue to be the main drivers of WCDMA growth over the next two years until larger subscriber markets such as China, India and Indonesia begin to deploy WCDMA networks and the cost of a WCDMA handset becomes more affordable to the average subscriber in these markets.

Q: What is the future of Vodafone in Japan?

Nicole McCormick: Some analyst speculation is that Vodafone may not continue, as is, with its mobile business in Japan. However, it appears that the Vodafone Group may be waiting until early 2006 for evidence of any real improvement in Japanese subscriber growth. And thus any decisions about whether Vodafone Japan grows organically or is put up for sale is likely to be deferred until next year.

A lot is resting on the success of Vodafone Japan's latest batch of handsets, which will be out in time for Christmas. Last winter's handset range were pretty much a flop.

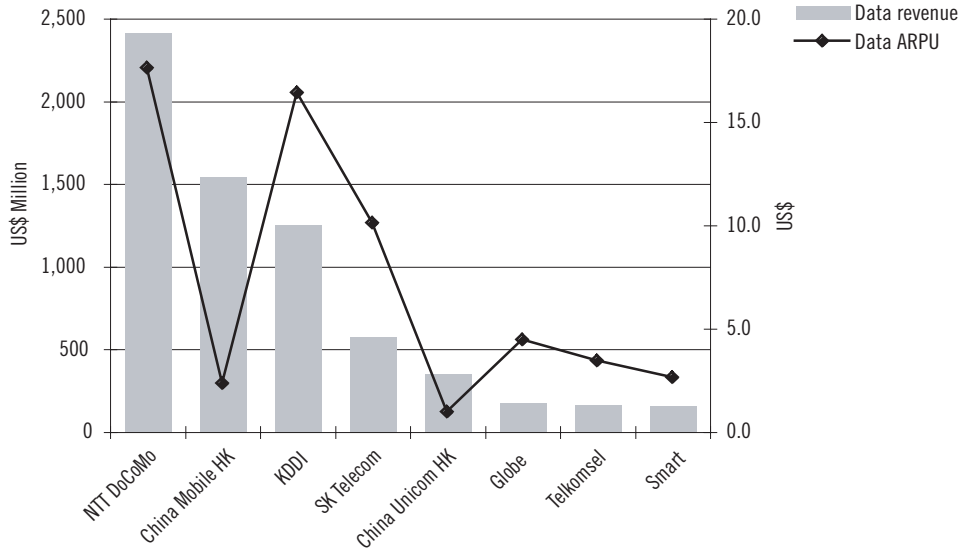
"All seven handsets that we released in December 2004, bar one NEC terminal, were Vodafone Group 3G handsets," said Vodafone Japan spokesperson, Matthew Nicholson. "This year, three handsets are exclusive to Japan – Sharp's 703SHf, NEC's 703N and Toshiba's 903T - and the user interfaces of the other four Vodafone Group handsets have been customized for Japan to quite a large degree."

Q: Which Asian operators are generating significant revenues from their data services?

Liz Hall: There are generally two groups of operators recording large amounts of data revenue from their subscriber bases; those that have subscribers using mobile data services on a regular basis and those where the subscriber bases are so large that their overall revenue from data services is bound to be considerable.

Operators in the well-known data-centric markets of Japan and South Korea dominate when it comes to generating revenue from data services (see Figure 2). NTT DoCoMo, which has the luxury of a relatively large subscriber base at over 50 million subscribers, plus a large volume of subscribers who actively use data services, generated US$2.4 billion from non-voice services during 2Q05. This is over 90% more revenue than nearest domestic rival KDDI, although this has narrowed from a gap of over 130% at the end of 1H04. Hutchison 3 in Australia, which is a pure WCDMA operator, is generating healthy data revenues with data ARPU at US$16.00 at the end of 1H05, adding up to US$18 million a quarter in 2Q05, equivalent to 17% of the company's total revenue. The Australian operator reported strong uptake of its content and messaging services at the end of 2005 with 420,000 content subscriptions sold at the end of 1H05.

Figure 2: Data Revenue and Data ARPU for selected Asia Pacific operators 2Q05



Source: Informa Telecoms & Media

China Mobile generates significant amounts of revenue from data, which doubled in value from 1H04 to 1H05. This is of course down to its huge subscriber base and when you take a look at the operator's data ARPU then China Mobile generates an average of just US$2.40 from data services from each subscriber per month. This is generally in line with other GSM operators in developing markets within the Asia Pacific region. Filipino operators Globe Telecom and Smart Communications, which both generate over 40% of their mobile revenues from data services, generated US$178 million and US$162 million respectively during 2Q05. Despite having sub-US$5.00 data ARPU, both operators compare favourably, in terms of total data revenue per quarter, with operators in more advanced markets such as Optus (US$123 million) and Telstra (US$120 million) in Australia.

Q: What is the state of 3G licensing in Asia Pacific?

Nicole McCormick: China, India and Indonesia are still to reveal their 3G licensing hands. Latest speculation is that China will issue three 3G licenses in 1H06, while the Indian and Indonesian governments are still putting the finishing touches to their 3G spectrum policies. To the delight of the GSM Association, India has decided to reserve the IMT2000 core-spectrum band for 3G services and it looks like the Indonesian government will do likewise.

Pakistan, the fastest growing subscriber market in Asia Pacific in terms of percentage growth, is also formulating its 3G licensing plan, as is Thailand, whose framework should be out by end-2005, while the Philippines has just released fairly bulk standard 3G licensing policies.

In Taiwan, 3G services kicked off in July with the 3G battle there being fought on handset subsidies.

One of the most important test beds of how 3G services are being portrayed in Asia Pacific comes from Hong Kong, which is of course a crucial market for Li Ka-Shing's Hutchison Whampoa.

Around about two years ago, all eyes were on how Hutchison would pitch its 3G service. Would this be marketed as a premium service, and thus command a premium price, or not? At first, Hutchison did launch its 3 service in Hong Kong at a premium in January 2004, but that didn't last for long.

Today, Hutchison is offering heavy handset subsidies and cheap voice services for 3G and its handsets and service plans are priced substantially lower than its rivals. SmarTone, for instance, has been forced to increase its handset subsidies but it is losing market to 3: it has around 50,000 WCDMA subs compared with close to 400,000 subs at 3, while CSL has a paltry 10,000 WCDMA customers.

It seems the rest of Asia does also not view 3G as a premium product.

Q: Will WCDMA/HSDPA really replace EV-DO in South Korea?

Nicole McCormick: Before answering this, perhaps one must consider the reason two out of three operators in South Korea have chosen to roll out WCDMA/HSDPA. According to SK Telecom president, Shin Bae Kim, WCDMA has certain "benefits," including global roaming, and he praises the "very high speeds" of HSDPA and HSUPA. Kim also notes that the increasing number of 3GSM operators, will drive the cost of handsets down.

So, clearly, SKT doesn't want to miss out on profiting on the global transition technology that is WCDMA/HSDPA/HSUPA.

However, EV-DO has been good for SKT, which has notched up 7.64 million plain vanilla EV-DO subscribers plus 5.43 million subs to its multimedia EV-DO service June as of end-August. Rival KTF claimed 4.13 million EV-DO subs and 1.29 million VOD EV-DO subs as of end-August.

As to whether WCDMA/HSDPA will replace EV-DO in South Korea, the answer to that is probably "yes" since the operators appear to have their long-term evolution strategies focused down the 3GSM pathway. Moreover, SKT will have WCDMA/GSM/EV-DO handsets in the market sometime next year.

In contrast, LG Telecom has begun investing in EV-DO Revision A technology, according to reports. LGT is thought to have requested Rev. A equipment from Lucent Technologies and is expected to run a Rev. A trial in 2Q06, set up a commercial version in 3Q06 and launch by year-end.

LGT is pursuing Rev. A after ditching its 1xEV-DV initiative earlier this year, after Qualcomm and Nokia suspended EV-DV development in favour of focusing on EV-DO and Rev. A.

Liz Hall is a Principal Analyst

Liz is responsible for co-managing the data research team with special focus is on developments within the Asia-Pacific region. Liz has presented at industry events, including the annual 3GSM Asia-Pacific conference.

Nicole McCormick is a Managing Editor

Nicole is the managing editor of *ASIAcom*, which covers the telecom, broadband and television sectors in Asia-Pacific, which she helps compile, oversee and sub-edit from Informa's Brisbane-based office. She has been editor of *ASIAcom* for six years. Nicole worked in the UK in late-1996 as the inaugural reporter on *TVI Daily* for one year and then took over as senior reporter on *ASIAcom*, before her promotion to editor of the newsletter.

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Europe

The flurry of M&A activity we've seen across western Europe as markets consolidate underlies what we have known for a while – market maturity. Here, ***Devine Kofiloto*** *says operators are now looking to grow, and reduce competitive intensity, through acquisition rather than organic growth. Meanwhile,* ***James Baker*** *says that central and eastern Europe still offers a number of expansion opportunities for investors looking to capitalize on growth markets.*

Q: Have we seen an end to the recent M&A activity across Western Europe?

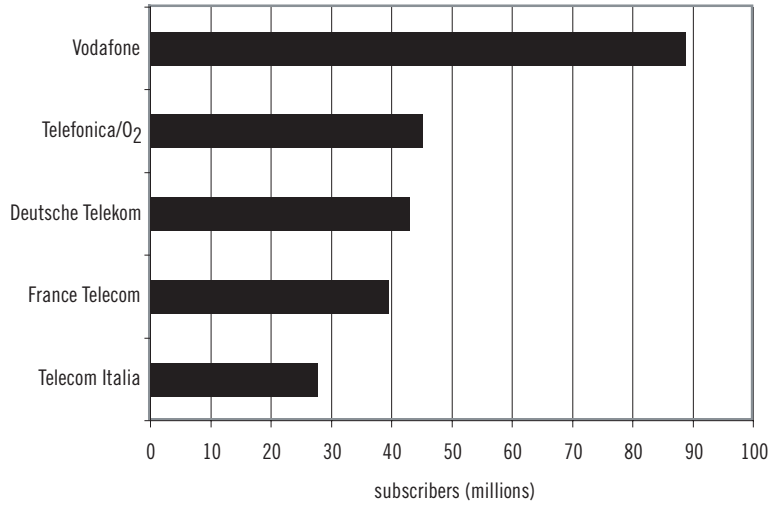
Devine Kofiloto: The spate of M&As that we've seen across western Europe in the last couple of quarters is definitely not over. With mobile markets maturing and the increasing competition in markets across the region, there is still a case for consolidation within markets. Following the most recent mergers, where we have seen KPN acquiring Telfort in the Netherlands, T-Mobile acquiring Tele.ring in Austria, France Telecom taking over Amena in Spain, Eircom taking over Meteor in Ireland and Orascom moving in to acquire WIND in Italy, we can expect further activity in other key western European mobile markets in 2006.

Telefonica's all cash offer for O_2 in the UK had been in the cards and comes as no surprise as O_2 has for some time now been seen as a likely acquisition target. With this move, Telefonica has now firmly announced its presence back in Europe, following its disastrous European 3G adventure. The re-focus on Europe began with the acquisition of a 51.1% stake in Cesky Telecom in the Czech Republic during the early part of the year. Should the deal meet regulatory approval, it elevates Telefonica from its current ranking as the seventh largest Western European player (in terms of subscriber numbers) to the number two position behind Vodafone, with a total subscriber base of 44 million subscribers (see Figure 1).

Telenor's acquisition of Vodafone's operation in Sweden (yet to meet regulatory approval) finally completes its pan-Nordic footprint and leaves it better positioned to compete with TeliaSonera, its pan-Nordic rival. For an operator which has over the last few years embarked on buying up minority share holdings in many of its operations to further realise group synergy benefits, Vodafone's decision to sell did come as a surprise, even though the operation was underperforming.

The last has definitely not been heard from KPN, which failed in its bid to takeover O_2 in 2004. It was also reportedly interested in a joint bid – with Deutsche Telekom – for O_2. The intention was to see KPN taking over O_2's German subsidiary and Deutsche Telekom assuming control over the UK, Ireland and Isle of Man units.

Figure 1: Top 5 operators in Western Europe



Source: Informa Telecoms & Media's World Cellular Information Service

Danish operator TDC, with a footprint in Switzerland and Germany and minority stakes in operators in Lithuania, Poland, Austria and Oman, is also another likely acquisition target. Swisscom, attracted by the prospect of consolidating TDC Switzerland within its operations, is believed to have expressed an interest. Most of the interest though is coming from venture capitalists, which market observers believe are mainly looking to strip and sell off parts of the business. Reports of TDC appointing Goldman Sachs to look for a potential buyer possibly reinforces this view, as it preferred a strategic stake holder, rather than a financial one.

This aside, with MVNOs and service providers becoming increasingly disruptive in some Western European markets, we are very likely to see further acquisitions such as those already witnessed in Denmark, Norway, and Finland. The drivers for such acquisitions are very likely to be securing the MVNO traffic on an operator's network and curbing the competitive intensity, as was the case in the Nordics.

Q: How are operators driving subscriber uptake given that western Europe has such high penetration levels?

Devine Kofiloto: With the regional mobile penetration level at 90% in 2Q 2005 – and in some key markets over 100% - it is becoming increasingly difficult for western European operators to draw in new subscribers. However, in spite of the decline in net additions across western Europe, we will still see a continuation of subscriber growth well into 2006. Though net subscriber additions in most of the key mature markets have generally been on the decline over the past few quarters (notwithstanding seasonal variations), it would be wrong to suggest that there is no longer growth potential in some of the developed markets. Many operators have been able to target new niche segments, such as the under-14 age group. The

emergence of MVNOs targeting under-served markets with targeted mobile offerings is also contributing to this continued growth.

It must be stated, though, that taking into consideration the limited size of the addressable market in the individual countries' it is more probable a substantial proportion of growth is also attributable to existing customers buying secondary SIMs.

Q: What are some of the key challenges facing Western European operators?

Devine Kofiloto: The ability to deliver ARPU-generating applications to halt the general decline in ARPU levels still remains the key challenge facing the major Western European operators. 3G is yet to deliver on its promise of significantly increasing data ARPU. Though mobile data continues to contribute an increasing proportion of operators' total revenues, it is still basic SMS that is driving growth in this sector, in spite of the investment in 3G networks. Laptop cards are gradually beginning to emerging as a significant mobile data revenue stream for at least some of the major operators. However, the technical limitations of WCDMA (as regards throughput and higher data speeds) has held them back from deploying richer enhanced services and data applications for the predominantly business users. Overcoming these limitations to deliver the true broadband applications that 3G was designed for is the key driver for operators wanting to upgrade their infrastructure network to HSDPA.

Vodafone has announced plans to deploy HSDPA technology, beginning with friendly trials and pre-commercial launches in 1H 2006 followed by a commercial launch in mid-2006, while T-Mobile announced that it will be the first mobile operator in Germany to market HSDPA enabled data cards for laptops, from 4Q 2005. We are yet to see if these network upgrades will improve quality of service and usher in a new wave of data card usage among business users.

One other emerging challenge is regulatory. Operators are already suffering from the impact of regulatory cuts on mobile termination costs, which generally accounts for about 20% of their revenue, and the EU is now exerting pressure on them to reduce roaming prices. Should the EU move in to regulate roaming prices in 2006, if they do not fall closer in line with domestic prices, operators could see their ARPU decline further. Moreover competition and the introduction of new technology continue to drive mobile tariffs lower, highlighting the increasing importance to find other revenue streams from new services if operators are to sustain or increase profitability in the coming years.

Q: Which markets in CEE still have scope for international investment?

James Baker: Despite the recent flurry of acquisition-and-licensing activity in central and eastern Europe, a number of expansion opportunities remain for investors looking to capitalise on growth markets in the region. Poland, with a population of 38 million, is the

region's second-largest market after Russia, and with penetration at 66.57% at end-2Q05, the country presents a growth opportunity for greenfield operator Netia Mobile, which won the bidding in the tender for a the country's fourth UMTS licence, awarded in May.

In Russia the government is expected to privatise a 75% stake in state-owned regional fixed-line operator Svyazinvest in 2H 2005. Three of Svyazinvest's seven regional subsidiaries have sizable mobile franchises, and investors including MTS-owner Systema, Alfa Group and MegaFon shareholder TelcomInvest are expected to bid.

In Ukraine, the market is still effectively dominated by the duopoly of MTS-backed Ukrainian Mobile Systems and Kyivstar, majority-owned by Telenor, but at least one of the three smaller players, Ukrainian Radio Systems, is up for sale by Privatbank, although a boardroom battle at VimpelCom is preventing its sale to the Russian operator.

Outside the former Soviet Union, Serbia represents one of the few remaining eastern European markets where the regional heavyweights do not have a presence. Both incumbents are due to be privatised and the market presents clear growth potential, with a population of 10 million and penetration below 50%. mobilkom austria has already confirmed its interest in acquiring Mobtel as part of a wider regional expansion strategy, although it will likely face stiff competition from Russia's Alfa Group, Vodafone, Orange and Deutsche Telecom (via Matav).

mobilkom is also eyeing Bosnian operator Eronet. But, as with Mobtel, ownership disputes and uncertainty are delaying the process, and the Austrian company will not make a decision until they are resolved.

Q: How can Russia's operators sustain profitability as growth slows?

James Baker: Russia's mobile operators are increasingly looking to value-added services as the 10-year growth phase in the region's largest mobile market comes to an end and because increased penetration has seen ARPU fall to less than US$10.

After Russia's subscriber base doubled every year from 1996 to 2003 and grew 90% in 2004, growth is expected to slow to 30% this year and to 13% in 2006. At the same time, competitive pressure and an increasing number of lower-spending subscribers have caused ARPU to drop significantly. Russian operators' average ARPU has fallen from more than US$25 in 2001 to less that US$10 in 1Q05, according to Informa Telecoms & Media data. For VimpelCom, the fall has been even greater, from US$40 to US$9.

MegaFon's revenue from non-voice services stands at 12% and the operator is aiming to increase that to 16-18%. But SMS is likely to be the main driver of non-voice revenues for some time.

VimpelCom also expects revenues from VAS to increase from their current 10-15% of total revenues to somewhere closer to 20%. With penetration of VAS services low, it could triple in the next year.

MegaFon is already running several value-added services, including location-based services, and its mobile TV service has more than 12,000 subscribers in Moscow. But MegaFon and other operators face challenges in service adoption because of their lack of control of the handset market in Russia, where devices are typically sold without SIM cards through independent retailers.

Q: What technologies are being deployed in central and Eastern Europe?

James Baker: The CEE region differs from western Europe in that CDMA technology has been run in conjunction with GSM. Despite the fact that many of the region's countries have less developed markets, it has seen some of the most advanced technologies utilised early in their life-cycle.

Russia's SkyLink launched in the Chelyabinsk region of the Urals earlier this month, marking the most recent stage of its strategic ambition to deploy a national CDMA450 network in Russia, but handset availability continues to present a major obstacle to acquiring subscribers. Furthermore, the operator is preparing to convert its networks in Moscow and St Petersburg to EV-DO.

In the Czech Republic, where Vodafone, T-Mobile and Telefonica compete through their respective subsidiaries, subscribers have the choice of GSM/EDGE/WCDMA, EV-DO and UMTS-TDD.

In Bulgaria, Serbia and Belarus, regulators have also begun to license WiMAX, bringing further technology choices to subscribers.

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Middle East and Africa

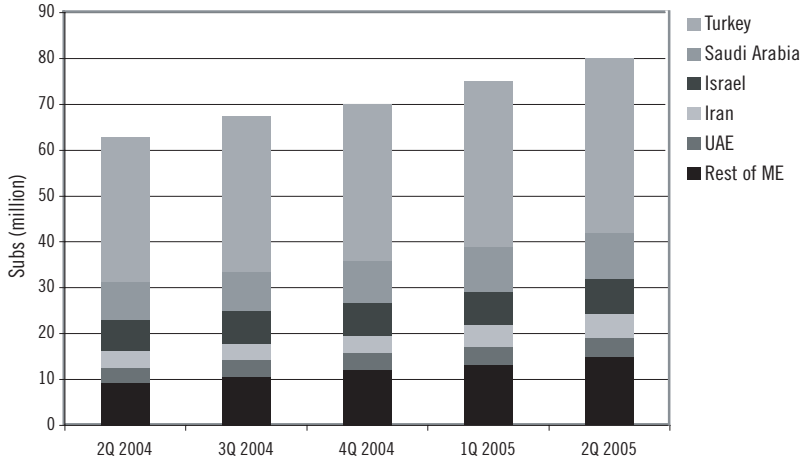
The mobile market in Africa and the Middle East is largely divided between the provision of basic voice services in Africa and the increasing popularity of advanced data services in the Middle East. Both markets are thriving with a total of 182 million subscribers as of 2Q05. Here, ***John Everington*** *and* ***James Baker*** *look at the strengths of the Africa and Middle East going forward, the main factors threatening growth and which companies are investing in the region.*

Q: How strong was subscriber growth across the Middle East and Africa in 2005?

John Everington: Mobile subscribers in the Middle East, including Israel and Turkey, grew to 81.9 million at the end of 1H05, a six month growth of 17%. We estimate that the number of subscribers in the region will hit 88.4 million at the end of 2005.

As the largest and most competitive market of the Middle East, Turkey enjoyed another bumper year of growth, with over 8 million subscriber net additions in 2005. Saudi Arabia enjoyed its largest-ever year of growth, with a massive increase in subscriber net additions resulting from the launch of second operator Mobily in May 2005. Mobily, owned by the Etisalat of the UAE, is the fastest growing operator in the region, registering 1 million subscribers within three months of its launch.

Figure. 1: Middle East's mobile subscribers (June 2004 to June 2005)



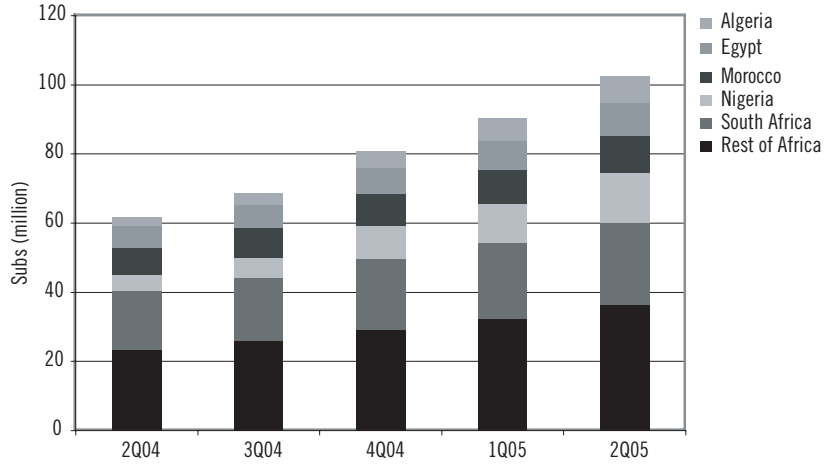
Source: Informa Telecoms & Media's World Cellular Information Service

James Baker: Africa had over 100 million subscribers at the end of 1H05, up from 60 million a year earlier and representing a growth of 65% year on year, making it the fastest growing region in the world. A number of countries in Africa have seen growth of well over 100%,

albeit from a low base. Nevertheless, these include major regional markets, such as Nigeria, Algeria, and Libya.

The Nigerian market has seen particularly strong growth in the past year. The region's most populous nation saw subscriber numbers increase from 4.9 million in 2Q04 to 14.7 million in 2Q05, an increase of over nearly 200%. Nigeria's second and third placed operators, Globacom and VMobile, saw subscriber numbers increase by 258% and 229% respectively. This growth has not gone unnoticed.

Figure. 2: Africa's mobile subscribers (June 2004 to June 2005)



Source: Informa Telecoms & Media's World Cellular Information Service

Africa's four largest investors are set to slug it out for control of Nigeria's national fixed-line operator, Nitel, which also owns GSM operator M-Tel, after MTN, Celtel, Vodacom and Orascom all made the shortlist of preferred bidders for a 51% stake in the operator, with the winning bidder due to be announced before year-end.

Q: What factors threaten operator growth?

James Baker: Many markets still suffer from excessive regulation and taxation, which is hampering operators' ability to extend their networks and keep tariffs low. In July, Uganda's three operators, MTN Uganda, Celtel Uganda and Uganda Telecoms, all increased tariffs to reflect a rise in airtime tax and VAT introduced in June's 2005/2006 budget. The airtime tax has jumped from 10% to 12% and VAT from 17% to 18%. The tax is likely to slow take-up of mobile services at a time when the government is attempting to increase the use of information technologies in the country.

Furthermore, government intervention has made things difficult for some operators. In August, Telekom Malaysia's attempt to sell its 60% stake in Malawi's TMN was put in jeopardy after the government decided to halt the privatisation of fixed-line incumbent

Malawi Telecommunications (MTL), which owns the remaining 40% of TMN. MTL's long-running privatisation had the rug pulled from beneath its feet at the last minute when President Bingu wa Mutharika announced that the sale of MTL had been suspended "until one or two issues are resolved." A spokesman for the Privatization Commission of Malawi told the Informa Telecoms & Media's MEAWA newsletter that the government had given no indication about when - or whether - the sale would proceed.

In Kenya, the Minister of Communications Raphael Tuju has vetoed a bid by Vodafone to take control of the country's largest GSM operator, Safaricom, casting doubt on the government's commitment to liberalising the sector. Vodafone submitted an offer to the Kenyan government in late June to increase its shareholding in Safaricom from 40% to 51%. But Tuju announced that the government had rejected Vodafone's offer, telling MPs that shares in Safaricom were not for sale.

In February, Tuju dismissed the head of the country's regulator, the CCK, prompting doubts among industry commentators about the government's commitment to an independent regulator. The minister has also been criticised for his treatment of Econet Wireless, holder of the country's third GSM licence. Tuju said in April that Econet would not be allowed to begin operating in Kenya, claiming it was not properly licensed to operate after the company's licence was annulled in November 2004. Although the Kenyan High Court overturned the decision the following month, Tuju said Econet had failed to perform to an adequate standard in other African markets.

John Everington: The mobile sector in the Middle East has flourished in the past 24 months largely due to extensive liberalisation and increased private funding in the majority of countries. However, growth has been hindered in markets such as Iran and Lebanon due to government intransigence when it comes to telecoms liberalisation.

Although the Iranian government announced its intention to bring in a second mobile operator in late 2002, the monopoly of TCI remains intact in 2006. Turkcell was selected by the government to build the country's second operator Irancell in early 2004, but a long-running disputes over ownership and management of the new network led to the company being thrown out of the process in October last year. The government has held discussions with MTN about coming in in Turkcell's place, but the government's heavy hand in the process so far does not bode well for the future.

Lebanon's mobile sector remains in limbo due to the delicate political situation in the country. Despite indications in 1H05 that the government would re-privatise the country's two mobile networks (currently managed on behalf of the government by Kuwait's MTC and Detecon of Germany), any progress is likely to be slow.

A number of markets in the Middle East are approaching full penetration; Israel passed 100% mobile penetration in 2002, followed by Bahrain, Kuwait and the UAE in 2005, with Qatar set to follow in 2006. Operators in the countries are increasingly looking for investment opportunities outside their borders, within the Middle East and Africa, but also in the Asia Pacific region as well.

Q: Who is investing in Africa?

James Baker: Africa's low penetration and high growth rate have not escaped the notice of international operators and investors seeking a slice of the action, and two major acquisitions were announced in 1H05. In April, the UAE's Etisalat joined the ranks of companies looking to Africa for further growth when it acquired half of west-African investor Atlantique Telecom. Etisalat has also been awarded a 10-year contract to manage the company's six west-African operations.

While financial details were not disclosed, Etisalat's acquisition provides a much-needed financial lifeline for Atlantique, which has been troubled for some time. Atlantique purchased Telecel's networks in Benin, Burkina Faso, Gabon, Niger, Togo and Cote d'Ivoire from Orascom between 2002 and 2004 and is struggling to pay for its acquisitions and upgrade its networks.

Etisalat's deal with Atlantique represents another blow to MTN's African expansion plans, after its bid for Celtel failed. MTN has struggled to expand its presence in Africa and elsewhere since acquiring its licence in Nigeria in 2001. In 2004, the company failed in high-profile bids to win licences in Iran and Saudi Arabia.

Africa is also seeing interest from more established European operators, with the upcoming privatization of Tunisia's Tunisie Telecom attracting the attention of France's Bouygues Telecom and the upcoming award of a third licence in Egypt also likely to attract interest from large international groups.

Q: What stage is mobile data and 3G at in the Middle East?

John Everington: Mobile data services are becoming increasingly popular within the Middle East, with virtually all operators offering GPRS and MMS as a fully integrated part of their service offerings. Even Saudi Arabia, which banned camera handsets until early 2005, has embraced MMS. The country's largest operator STC, which launched MMS in May, had over 1 million users of the service by early September.

Some operators have begun experimenting with PoC, but the jury is out as to whether the service will find much traction in the region. Cellcom and Pelephone both launched the service in 2004, but have not witnessed any significant take-up. Etisalat became the first Arab operator to launch the service in September, with Palestinian operator Jawwal set to follow suit in January.

3G is still very much in its nascent phase in the Middle East; Israeli operators have thus far led the charge, all three launching 3G in 2004. Partner had 35,000 3G subscribers at end-June, but Pelephone (which launched EV-DO in September 2004) and Cellcom have so far been struggling, each with less than 10,000 3G subscribers at the same date. Cellcom and Partner will begin offering HSDPA in 2006.

Elsewhere, only Etisalat and MTC-Vodafone Bahrain have launched 3G in the Middle East. The two operators had signed up less than 50,000 subscribers between them at end-2005, due to a lack of compelling 3G applications, and a shortage of quality handsets. This is likely to change in 2005, given the increased availability of handsets such as the Nokia 6630 and 6680 in the region.

2006 will see 3G launches from Qatar's Q-Tel, Wataniya of Kuwait, Saudi Arabia's Mobily and the UAE's second operator Tecom.

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John is responsible for our special research focus on North Africa and the Middle East. He has been quoted extensively in the Middle Eastern press, and is a regular speaker at regional conferences.

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North America

2005 saw the completion of mergers between Sprint PCS and Nextel Communications, Sprint Nextel and several of its affilates, as well as Alltel and Western Wireless. Clearly, the North American wireless landscape has entered a state of near-constant flux, with new technologies and competitors adding to the already electric atmosphere. ***Tammy Parker*** *reviews competitive issues in North America and looks at prospects for MVNOs, mobile video and more.*

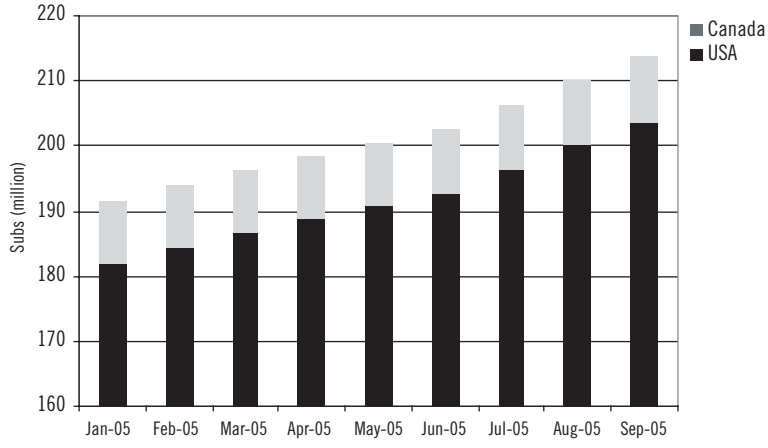
Q: What are the subscriber growth trends in North America?

Tammy Parker: Both the U.S. and Canada are expected to see their mobile penetration numbers skyrocket now that the 50% thresholds have been breached. In 3Q05, U.S. wireless penetration was around 66%, while Canada's penetration hovered around 49% and was ready to tip the scales at 50% any day, with the country likely wrapping up 2005 with at least 52% penetration.

The arrival of MVNOs is helping both countries grow their mobile subscriber bases. Youth, ethnic communities, consumer brand loyalists and high-tech early adopters are all segments being targeted by MVNOs. These are segments that the traditional operators have not been able to satisfy due to their mass market perspectives.

In addition, a huge positive for operators is the fact that customer turnover has dropped substantially. U.S. customer churn was 1.9% for 2Q05, an improvement over the 2.2% rate in 2Q04 and the much higher rates recorded in quarters and years before.

Figure 1: North American subscriber growth trends in 2005



Source: Informa Telecoms & Media's World Cellular Information Service

Q: Where does North America stand in terms of 3G deployments?

Tammy Parker: Verizon Wireless and Sprint PCS are going gangbusters with their 1xEV-DO Revision 0 deployments, which targeted business users at first but are growing to target consumers. Next, they are looking to deploy EV-DO Revision A, which will give them much higher speeds on the uplink and potentially enable VoIP. Cingular Wireless will launch the world's first commercial HSDPA networks at end-2005. And smaller operators are getting into the 3G act as well. Alltel has deployed EV-DO, and Leap Wireless intends to deploy the 3G technology in 2006. In Canada, Telus and Bell Mobility are both upgrading to EV-DO upgrade.

Operators waiting in the wings include Canada's Rogers Wireless, which is expected to deploy WCDMA/HSDPA eventually, and T-Mobile USA, which needs to acquire spectrum at this summer's Advanced Wireless Services (AWS) spectrum auction so it can finally take the 3G route.

Cingular has noted that it will gain considerable voice capacity from its new WCDMA/HSDPA networks, which offer simultaneous voice and data capability, and if operators start using EV-DO and HSDPA networks for VoIP that will further up their voice capacity and service capabilities.

From a consumer perspective, it's not clear whether 3G content is unique enough to stand out from data services offered on the operators' older networks. And prices are still high for all-you-can-use 3G service over a PC data card, but I believe that's quite intentional on the operators' part. There's no sense letting Internet surfers clog up their networks and steal capacity from other services. But from a customer's perspective, if you consider that a wired broadband cable or DSL connection into one's home generally costs in the US$40-$50 range, then US$60 for fully mobile broadband capability is not bad at all.

Q: What role will so-called 4G and related OFDM technologies play in the region?

Tammy Parker: There is already a lot of experimenting going on, and I expect there will be lots more to come. Sprint Nextel has confirmed it is eyeing WiMAX, WiBRO, TD-CDMA, FLASH-OFDM and EV-DO Rev. B. One reason that the company is so frantically involved in exploring multiple technologies is that it has a window of opportunity to get a head start on the rest of the market by offering new multimedia services in its 2.5GHz spectrum, where it is a dominant player. No one has ever made a successful business out of that spectrum in the U.S., but I think Sprint Nextel will surprise us all with what it eventually builds out and offers in that band.

My perception is that there are enough technologies, enough spectrum, enough operators and enough potential new entrants to open the door to any number of new approaches. The world is not as simple as it used to be with two or three wireless technology camps fighting it out.

Q: How do you think mobile video will fare in North America?

Tammy Parker: Mobile operators in this region have jumped into mobile video in a big way. Sprint PCS and AT&T Wireless, which was acquired by Cingular Wireless, set the pace early on by offering channels from MobiTV over their existing networks. And Canada's three national operators launched MobiTV services in late summer 2005.

Of course, the next step in mobile TV is broadcast/multicast delivery over in-band 3G networks as well as out-of-band parallel networks. This is where things are going to get very interesting in the United States. Tower company Crown Castle is working on a DVB-H network slated for launch in 1Q06, while Qualcomm is readying its MediaFLO network, which uses the vendor's FLO technology, for a soft launch in mid 2006. Such head-to-head competition – coupled with the availability of Hollywood content and liberal FCC regulations on the provision of mobile video – really opens the door for unique rivalries that operators and vendors worldwide will be watching.

Of course, the big question is whether mobile video will actually attract subscribers. Numerous end-user surveys have revealed that most people have no desire for mobile video on their handsets, so it appears that the industry could be accused of once again pushing technology at consumers that really don't want it. However, one truth about consumer surveys regarding never-before-seen products is that the average person is usually not imaginative enough to fully grasp the concept of the product being envisioned by technologists. My experience with mobile TV demonstrations is that the idea sounds silly from a logical point of view, but when I'm watching a demo handset with a multimedia player, I'm captivated. I imagine this could be true for John Q. Public as well.

Another point to note is that mobile video services will be aimed at early adopters, youth and young adults. Younger people today want to be constantly connected to a computer, and/or handset with IM capability and/or portable DVD player and/or an MP3 player. That's the audience that mobile video is being built for and a compelling collection of content at the right price could certainly draw in these subscribers.

Q: What role, if any, will MVNOs have in mobile video and other emerging services?

Tammy Parker: North American MVNOs are poised to play a crucial role in this area. Companies such as SK-Earthlink and Amp'd Mobile want to offer cutting-edge wireless data and mobile entertainment using 3G networks only, which is a broad departure from the first MVNOs that competed only on price for the lowest-hanging fruit – the prepaid customer. Price is no longer the driver for this latest crop of MVNOs, which generally say their voice services will be competitive but not cheap. Instead, they are hoping their trendy content and innovative applications will draw in the crowds.

MVNOs have a lot more freedom than a traditional operator when it comes to offering edgy content. Amp'd has said it wants to offer adult-oriented entertainment, which will be filtered and protected so underage people won't be able to access it. That's a far cry from the usual mantra of the leading mobile operators, which want nothing officially to do with adult content for fear of alienating their mainstream customers. But because an Amp'd or similar MVNO is not going after the mainstream, it can build its business plan on offering unique services that a network operator would not touch.

Further, because the business plans of some of these MVNOs rely heavily on mobile data services, they have no choice but to be as innovative as possible. I hope we see some imaginative offerings from them. Their successes or failures might even answer the age-old search for wireless data's killer app.

Q: Is there room for more consolidation in the U.S.?

Tammy Parker: Absolutely. This is one of my favourite soapboxes. The consolidation craze has in many ways been indirectly driven by groups that demand spectrum licences be initially assigned by relatively small coverage areas. Further, consumer groups have succeeded in having federal regulators set aside chunks of spectrum for auction only to what are deemed entrepreneurial businesses and provide bidding credits for such organisations. But those efforts fail to acknowledge the reality that providing cutting-edge services that consumers and businesses desire generally requires economies of scale accrued through large coverage areas plus a lot of capital expenditures. That's why we've seen so many small operators go bankrupt or get gobbled up by larger competitors. Telecommunications is a deep-pockets game, and the rash of mergers and acquisitions we've seen lately in the U.S. reflects a patchwork market trying to correct itself.

That's not to say that there aren't viable small competitors, but the system that enabled them also instinctively drives the U.S. market to continually re-rationalise itself though consolidation, which would not be necessary if nationwide or at least regional licences were issued by the Federal Communications Commission.

One need only look to Canada to understand the benefits of more rational licensing. The country had four national operators, now only three with Rogers Wireless' acquisition last year of Microcell. Canada's three national operators consistently hold the top three spots in rankings of North American operators by cash flow yield. Further, when one ranks North American operators by quarterly metrics such as churn, ARPU, etc., the top four or five spots generally include Canadian operators Telus Mobility and Bell Mobility. Canadian operators have been able to become top performers that don't have to spend their energies trying to acquire other small operators to fill gaps in their coverage. And I don't think Canadian subscribers have been slightly by the reduced number of competitors, because there is strong

competition among the operators and, increasingly, from MVNOs that are able to target underserved segments because they don't have to take on the costs of network build-out and operation.

The economies of scale favouring consolidation guarantee that there will be more mergers and acquisitions in the U.S. wireless market. Operators require more spectrum in order to increase their market share and deliver advanced services, and one way to get that spectrum is to buy a company that has the licence to it.

But, even in light of continued consolidation, it's important to note that because we are seeing disruptive technologies such as WiMAX, ultra wideband, software-defined radio and many other new approaches materialize – all of which can use a host of frequency bands – there is a near guarantee of competition emerging not just for mobile operators but for all telecommunications carriers. VoIP is shaking up the wired world, and it will shake up the wireless world as well. WiFi and WiMAX can complement as well as compete with cellular networks. Even a highly consolidated mobile industry will have to be savvy to survive when faced with the new breed of competitors.

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Tammy heads up Informa Telecoms & Media's research into the US wireless market. She's an expert on 3G, with a recent focus on the wireless Internet.

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Section 3

Content and applications

Mobile TV and video

Although early adopters are showing encouraging rates of usage of mobile TV, the mobile industry needs to manage the expectations of these services, especially as the penetration of mobile video-capable 3G handsets is still very limited, says ***Jessica Sandin****. Both the mobile and media industries still need to resolve issues around rights, business models and the role each partner will play in the mobile TV value chain.*

Q: What's the difference between mobile TV and mobile video?

Jessica Sandin: Well that's the question, looking at how the industry is using the terminology today. All of a sudden, any moving image on mobile can be referred to as 'mobile TV'!

Some argue that the term mobile TV should only apply to mobile broadcasting. However, outside Asia, the mobile TV channel line-ups advertised today are not broadcast, but streamed over mobile networks. In addition, some of the short video-clips available for download or streaming on mobile networks contain content from TV.

The industry has quickly become attached to the term 'mobile TV' because 'TV' is something consumers understand, so it's an easier sell. But there are a multitude of definitions, which may eventually confuse the consumers.

Q: This is clearly an area to be reckoned with going forward?

Jessica Sandin: Both the media and mobile content industries certainly expect so. But, as always, it's important to manage expectations – many in the mobile industry now find themselves having to try to calm down the enthusiasm of the TV industry. As always, takeup will be limited by handset penetration. The industry also has to get the pricing models and the user experience right.

The early results seem encouraging, though. For example, Orange says that both in France and in the UK, its mobile TV subscribers watch around 35 minutes per month. Typically users access TV in short snippets.

But, these are clearly early adopters. We don't yet know how well the concept will play in the mass market. After all, portable TVs have never taken off – but it's possible that the ability to catch snippets of TV over a device they already carry with them is more interesting to the users. But as always, we have a lot of hurdles to get past before the business can take off, too.

Q: So the media industry is keen on mobile. How much are they willing to risk on it?

Jessica Sandin: So far, the risk TV and film companies have taken is quite limited. If they produce made-for-mobile programming, they typically expect operators to pay or at least underwrite that production. The mobile content teams at studios appear to be growing, however – and importantly, the knowledge of and interest in mobile is starting to move beyond these central mobile-focused teams and into a much broader range of people within these companies. What's really needed is for those departments that are currently powerful within the media houses to see the potential of mobile as well.

Many of the media companies feel that, initially, their content is used to generate interest in and fuel take-up of 3G, so they reckon it's up to the operators to fund the content until revenues are substantial enough for a different business model.

On the other hand, some of the media houses may be prepared to make investments, but operators – uncertain of whether or not the business will work, or whether they themselves will be directly involved in content going forward – are not prepared to sign up for multi-year deals and display their commitment to mobile TV or TV-like services. So I think everyone's trying not to risk too much and are waiting for the right time to take the proper plunge. So much interest is generated in this sector now, though, that those that want to be leaders will have to commit.

Q: What are the main areas of contention?

Jessica Sandin: Apart from the cost and revenue tussle between the industries, the most obvious, as always, is the limited penetration of mobile video-capable 3G handsets. But there are also numerous question-marks around rights, business models and the role each part will play in the mobile TV value chain.

Rights remain a tricky area. Film makers and TV producers are only now starting to take mobile into account when drawing up contracts, which means that, until recently, mobile rights were simply not considered. Clearing new rights for any form of programming means going back to everyone involved in the creation of a programme – actors, directors, script writers, composers and so on – to clear mobile rights. It's not an easy process and many studios say a lot of content will never be cleared for mobile.

Many operators or TV broadcasters that have simply put mainstream channels up available for streaming on mobile are forced to black out any programming that they don't have the mobile rights to, which hardly makes for a good user experience. This is also why mobile TV services typically feature channels such as CNN, which is much more in control of the rights for programming on its schedule.

Interestingly, in France, regulation around must-carry of public broadcasting TV clashes with the lack of mobile rights those channels may have. French law says the country's public broadcasting channels have to be carried on all TV platforms – so they're on the 3G mobile TV offer Orange provides in the market. However, those TV channels haven't acquired mobile rights to much of the programming they show – which means that they could be sued by the rights-holders, who are obviously not happy about the situation.

For the rights holders, there is also a conundrum around mobile broadcasting. Typically, broadcasters have acquired broadcast rights – it doesn't matter which type of receiver is used to receive these broadcasts. That would imply that under current contracts, broadcasters also have mobile broadcast rights, even if they don't have mobile streaming or download rights. No doubt the rights holders will look to modify these terms if mobile broadcasting takes off, however.

Q: What are the business model and value chain issues?

Jessica Sandin: It seems that as always, everyone wants slightly too much of the end-user revenues – but there's also an issue around how the deals are struck that is causing some upset in the media industry.

Some operators – Vodafone has been fairly vocal about this – are looking to strike content deals for mobile TV directly with production companies or studios, because these are the outfits that have the rights. TV channels acquire the broadcast rights for programming, but often don't have the mobile rights. So, Vodafone reasoned, it should strike deals with the rights owners, who can then create mobile TV channels for Vodafone's offer. With some exceptions, there was less need for the TV broadcasters in this mobile TV equation.

This failed, however, to take into account the fact that the TV revenues of those producers or studios come from the TV channels. Even if the channels have chosen not to acquire mobile rights, their displeasure at being cut out was enough to upset the applecart. So the whole setup of mobile TV services is a bit uncertain. It also remains to be seen for how long the mobile operators choose to be the ones responsible for providing the mobile TV platform. Especially when mobile broadcasting becomes reality, we may well see existing satellite and cable TV platform providers play more of a role.

As I mentioned, the fact that broadcasters have chosen not to acquire mobile rights – or indeed, that mobile rights for quite a lot of programming are non-existent – causes problems in the areas where those channels participate wholesale as mobile TV chnanels, as well, since where the full TV channels are streamed to mobile, there are blackouts when there's programming to which that broadcaster doesn't have mobile rights.

Q: Why all the fuss about mobile broadcasting?

Jessica Sandin: Nokia has almost single-handedly created a lot of commotion around DVB-H, the mobile broadcasting standard it favours. There are a range of DVB-H trials underway across the world and in October, Italian operator Telecom Italia Mobile announced that it had teamed up with local mediahouse Mediaset to launch mobile TV broadcasting using DVB-H.

While mobile broadcasting will become necessary if rich media services such as mobile TV streaming really takes off – otherwise the mobile network will become overloaded – it's not going to be straightforward to find either the investment or the spectrum necessary for DVB-H in all markets.

Figure 1: Mobile TV broadcast networks – strengths and weaknesses analysis

	Strengths	Weaknesses
Analogue	• Live content • Useful for test marketing	• Reception quality • Power consumption • No customer interactivity
Streaming cellular broadcast/ MBMS	• No significantly extra handset BOM • Provides return path	• Not designed for broadcasting content as is based on a 1-2-1 topology • Added load on the network • Increases network signalling traffic • Limited bandwidth (even in 3G)
DMB (DAB)	• DAB is an open and well-established standard • DAB has existing infrastructure • Spectrum already licenced • Originally designed for use in a mobile environment (based on Eureka 147) • Only decodes parts of transmission stream at a time, saving memory, processing power and battery requirements • Use of advanced codecs • Needs only small antenna	• Regional frequency variations restricing data roaming • Licence restriction to only 20% of DAB spectrum for data services • S-DMB network expensive to build and run • Expensive to itegrate to device • No return path • Likely to increase size and weight of device
DVB-H	• Spectral efficiency (more than double that of DAB) • High data rates • Low power consumption • Support from key industry players e.g. Nokia • Derivation of DVB standard used for fixed TV broadcasting • Use of advanced codecs • Needs only small antenna • Content can be broadcast in original format	• Entire payload must be decoded before any channel can be extracted and displayed • High power consumption • More sites needed than DVB-T (but less than cellular) • Spectrum yet to be allocated • Lack of available UHF spectrum • Relatively expensive to integrate to device • No return path • High cost of chipsets • Likely to increase size and weight of device

Source: Informa Telecoms & Media

DVB-H is recognized as the highest-quality mobile broadcasting technology, but given that spectrum is not available for it in all markets, it's possible that DMB, which is an overlay over DAB (and therefore has got spectrum allocated already) will be what launches first in

some markets. That's what happened in Korea and Japan, for example. Some operators, such as T-Mobile, are trialling all available technologies.

Neither is DVB-H and DMB, which are both separate to the mobile network, the only options. Swedish vendor Ericsson is pushing MBMS, a broadcasting technology that runs on the UMTS network. This standard may be too little, too late, however. At Informa Telecoms & Media, we expect that DVB-H will eventually win the day.

All the mobile broadcasting technologies will require handset replacement, however, which means take-up will not be rapid. For now, operators must focus on encouraging users to access TV and video content over 3G.

Jessica Sandin is a Principal Analyst

Jessica is principal analyst for mobile content. She is one of Europe's foremost authorities, and has tracked the mobile data industry on a daily basis since 2000. Jessica is an engaging and respected speaker at industry conferences.

Mobile TV Strategic Report

Mobile TV: Broadcast and Mobile Multimedia provides a detailed, thorough analysis of the likely factors affecting the success of this sector, the real business case for mobile TV, the major players in the value chain and huge revenue opportunities for all involved

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Mobile music

In all parts of the world, the mobile has become a real means of buying music in one format or another, says ***Simon Dyson****. It is part of the evolution in music consumption and, along with Internet downloads, is the closest thing the music industry is likely to get to a new format. However,* ***Jessica Sandin*** *warns that the mobile music market remains nascent and has clearly not been proven yet.*

Q: What has the mobile done for the music industry lately?

Simon Dyson: The wording of this question suggests that the mobile has already cemented its place in current music industry thinking. I don't think there can be much doubt that it will figure highly in music company plans, but I think the level of headlines and press coverage of mobile music gives mobile a slightly overstated position.

Every time a new music format is created or a technical development facilitates the consumption of music, it is always at the expense of something else. I guess it's not hard to see why that series of events is always trotted out when you look back at the introduction of new hard formats. Twenty five or so years ago the CD was championed as the saviour of the music industry. Ten years after it was launched it accounted for the majority of album sales. Now it's taken for granted that when a music buyer enters a retailer to get the latest release by their favourite artist it will occupy pride of place in their CD collection at home a couple of hours later.

What isn't widely known is that music sales at the beginning of the 1980s had stalled around the £12 billion level. In fact, in constant currency terms the value of global music sales fell in 1979 and 1980. However, the launch of the more expensive CD format started the revenue ball rolling again. Fast forward to now and we're in a unique position where there is no new hard format to take over from the CD. Hi-end formats such as DVD-Audio and SACD are not going to have a mass appeal and the CD/DVD hybrid is expected to remain niche for the foreseeable future. The music industry is now in a unique position whereby it must sell more music to generate higher revenues. Enter (amongst other things) the mobile phone.

So far, downloads – either Internet or mobile – have not compensated for falling hard format sales. At the beginning of October 2005 the International Federation of the Phonographic Industry (IFPI) reported that "booming demand for music on the Internet and mobile phones nearly offset the decline in physical formats as recorded music sales fell 1.9% to a retail value of US$13.2 billion in the first half of 2005, compared to US$13.4 billion in the same period of 2004".

What isn't included in the overall total, however, are revenues from the sale of mobile phone ringtones. In Informa Telecoms & Media's Mobile Music report, we estimate that the value of global ringtone sales in 2005 would fall just short of US$5 billion. Not normally classed as a seasonal product, the addition of half-year ringtone revenues to the two IFPI totals translates to a value increase in music sales in the first half of 2005 of 1.9% (US$15.7 billion compared with US$15.4 billion).

Although the share of who gets what from the sale of a ringtone differs to that of traditional music sales, music publishers are still entitled to a share of around 15%. The major record companies publishing divisions account for around two thirds of all music sales. Once real tones replace polyphonic and monophonic, the record company share from a sale increases significantly. Perhaps now is the time to stop feeling sorry for the record companies.

Jessica Sandin: It's very interesting to see top music industry executives – such as Edgar Bronfman Jr of Warner Music Group – publicly putting so much faith in mobile as a music delivery mechanism. WMG, more than any of the other major record labels, is looking to make sure mobile is part of more of their business going forward and looks to secure mobile rights for more than the recordings its artists produce – in other words, the artist's likeness and so on. Nevertheless, the mobile music market remains nascent and has clearly not been proven yet. It's not like every band is going mobile.

Q: Will full track downloads emulate the success of ringtones?

Simon Dyson: If success is determined by revenues then there's no doubt about it. The timeframe for such 'success' is likely to depend on several things. I don't imagine consumers will put up with paying twice as much for a 30 second sample of music compared with a full track for too long. Already in some parts of the world a full track can be used as a ringtone. This could be one way of justifying a higher price.

Jessica Sandin: On the other hand, the debate on pricing of ringtones vs full-track downloads is becoming a bit tired. Consumers have so far shown they're willing to pay well over the odds for ringtones to personalise their phones. The industry should be pleased that these extra revenues are there rather than obsess so much about it.

A lot of users are not going to want fiddle around to create their own ringtone out of a full track – and the intro to a song is often not what you'd like as your ringtone. Consumers do pay for convenience – otherwise Starbucks would probably not be in business. Going forward, though, we'll most likely see bundled packages of full-tracks plus ringtone of the same song – this will be one way for the music industry to increase the price for digital downloads.

No doubt the users will ultimately make the call. Price per ringtone is already coming down since we've moved to a subscription model.

Simon Dyson: I guess one of the main deciding factors on the success of full track downloads is which party will drive, and ultimately benefit, from full track sales. Music owners are beginning to see profits from mobile music sales, but could stifle the market through ridiculous licensing demands. Mobile operators are currently driving full track downloads, but may not be the music brand which consumers prefer. Online digital music brands are beginning to make their plays into the mobile world but just might face resistance from the operators. Above all, the consumer market, which originally drove the unanticipated ringtone business, may make a totally leftfield decision and go for something completely different.

Jessica Sandin: I think it's also a question of pinpointing what, exactly, the mobile phone will be used for in the full-track download value chain. There's widespread recognition now that dual download (to mobile and PC) of any track purchased is essential. I'd envision that users will download music over-the-air to their phones only occasionally. However, the phone could well be used as a music discovery device and as a billing mechanism, with the track automatically added to the users' PC music collection. That's an excellent new revenue stream for operators that offer this service correctly. The best way for operators to do this may be to enable existing online music stores to mobilise their offer by having the enablers in place for the online retailers to appear on and retail through the mobile phone.

Cellcos shouldn't be too hung up on driving traffic through their networks, but instead use their relationship with the customer – and their billing capabilities – to drive additional revenues even if consumers choose to acquire their content by sideloading.

Q: There's a lot of talk about mobile phones replacing iPods. Will they?

Simon Dyson: If commuters on the London Underground between Barnet and central London are to be believed the answer to that question is no. For a recent report about portable music I asked several iPod owners whether they would rather have one machine that does everything or would they rather keep them separate.

Once they were happy that I wasn't looking to relieve them of their prized music player, all, with just one exception, were adamant that music players were for music and mobile handsets were not. However, hardly any of the candidates had actually used an MP3 enabled handset. Several did comment that if they were provided with a handset in their next upgrade that could store music they may think differently.

Some manufacturers of portable audio players have similar opinions to my unscientific underground respondents. John Moseley at Creative, which produces the Zen player, suggests that hybrid products often compromise certain areas. "If someone is interested in buying an MP3 player, they will look at a dedicated device," he states. "Music features may well be a deciding factor between two phones, but they are unlikely to influence someone whose primary interest is listening to music." Other manufacturers of MP3 players also expect to

be the second device in the users' pocket, with the phone continuing to be primarily a communications device.

The phone could, however, win out against the smaller, cheaper flash-based MP3 players.

It's also likely that the ability to download music directly to the phone won't be a main driver in the uptake of MP3-enabled handsets. Similar to the success of the iPod, sales haven't been driven by downloads from iTunes. Rather, music transferred to the iPod and other traditional portable players is ripped from CDs.

Figure 1: Global mobile music revenues 2005 and 2010 (US$m)

Share of total revenues (%)	2005	2010
Ringtone Downloads	89	60
Streaming Audio	1	5
Music Downloads	1	14
Ring-back tones	9	22

Source: Informa Telecoms & Media: "Mobile Music" (June 2005)

Q: What are the main issues still to be overcome to make mobile music a success?

Jessica Sandin: Simon has touched on some of these. Everyone wants a considerable piece of this new pie. Record labels, for example, demand a significant cut and this tends to mean mobile streaming services, for example, are not commercially viable.

There are a lot of questions around who is best placed to provide music services to the consumer. Record labels, for example, don't have direct relationships with users.

Problems around DRM and codecs – which vary between different services – also remain.

The industry's focus has also been too fixed on full-track downloads so far. There are various innovative ways in which you can use mobiles to market or discover music, for example. A lot of those avenues remain to be explored.

The focus on full-track downloads also means that mobile music outside ringtones is, perhaps unnecessarily, limited by the common mobile problem of limited penetration of music-capable handsets.

With new music-focused phones from the likes of Sony Ericsson, Nokia and Motorola, however, at least sound quality is becoming less of a problem.

Last but not least, there is another problem that affects a lot of mobile content. We've got two industries coming together that are very different and although they're getting to know each other better, they're not completely on the same wavelength. In addition, the music industry has got differences of opinion internally about digital as well, which hardly helps mobile music, either.

Simon Dyson is a Senior Analyst

Simon's main area of expertise is the music industry and he has authored several management and strategic reports on all aspects of the sector. He has also completed several music-related consultancy projects for music companies and music retailers. His knowledge of the music industry extends back over more than 15 years and was gained through performance, management and record company ownership.

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Mobile messaging

The push e-mail market is becoming increasingly crowded but remains minute and dominated by RIM's BlackBerry, says ***Guillermo Escofet****. Although actual numbers are hard to find, with the advent of Microsoft and Nokia, an increasing number of players are now fighting for a very small slice of a small market. He also warns that mobile IM and MMS – the messaging services that hold most promise for growth over the next few years – won't necessarily bring the greatest returns.*

Q: With both Microsoft and Nokia jumping into the mobile e-mail fray, what can be expected in this increasingly crowded market?

Guillermo Escofet: The enterprise mobile e-mail market is hotting up as more and more players jump into its hardest fought arena, push e-mail. The latest to join the battle are Microsoft and Nokia – two heavyweight contenders from the IT and mobile worlds respectively that pose the most formidable challenge so far to established vendors.

Microsoft is about to release a free upgrade to Exchange 2003 servers that undercuts all other push e-mail solutions in the market. Nokia, meanwhile, has just launched its own push e-mail platform that doubles as a basic framework for enterprise-wide mobility.

Yet the size of the push e-mail market is still minute. Estimates vary, but there are probably 5-6 million push e-mail users globally, a penetration rate of far less than 1% of the world's total number of corporate e-mail users (660 million). The room for growth is potentially huge, especially if push e-mail services start reaching down to rank-and-file business users and consumers, but it's currently a very crowded market. All the more so when considering that Research In Motion, the market's trailblazer, accounts for 3.65 million users with its iconic BlackBerry service, leaving a relatively small pie to be shared among other players.

Some consolidation has taken place in the past 12 months. U.S.-based Seven, one of the many white-label vendors challenging RIM, has swallowed up European counterpart Smartner. Also, Good Technology recently acquired the mobile e-mail business of JP Mobile. But this has not been enough to make up for the profusion of players now crowding into the market. As well as well-known contenders such as RIM, Visto, Seven and Good, there's Intellisync, Extended Systems, Notify Technology and Ericsson. Oracle, meanwhile, is rumoured to be gearing up to also make an entrance. Then there are other vendors, such as Comverse and Infowave, which have had a push e-mail capability for some time but have not put much effort into selling it as a standalone product.

Q: What does this mean to market leader RIM?

Guillermo Escofet: The presence of so many vendors trying to muscle into the niche carved out by RIM presents a potential threat to the BlackBerry maker's market dominance. As with many market pioneers, RIM's largely proprietary and, some would say, overpriced solution could be pushed into a corner by more nimble solutions. But there's little sign of that happening at the moment. RIM is going from strength to strength, capitalizing on the strong market momentum that has built up around the BlackBerry brand, and has now signed deals with more than 100 operators around the world. So it's likely that RIM will continue to play a dominant role for some time yet, if not as a clear leader like today, at least as one of the top two-to-three players.

Q: And are there opportunities for the two heavyweights - Microsoft and Nokia?

Guillermo Escofet: It's safe to assume that Microsoft is also likely to take on a leading role, just because of its sheer muscle in the corporate-e-mail-server world. True, its Direct Push product is just focused on Exchange – and on latter editions at that. Also, it's primarily designed to work with handsets powered by Microsoft's Windows Mobile 5.0 operating system. And although it saves companies the cost of having to install a separate mobile e-mail server, this also means that the level of functionality it can provide is arguably less sophisticated than that of existing solutions with their own gateways.

These factors limit Direct Push's scope somewhat. Even so, according to Microsoft, Exchange 2003 represents a potential market of more than 120 million users. And Direct Push is in theory compatible with non-MS handsets enabled with Microsoft's ActiveSync client, licensed by the likes of Nokia, PalmOne, Motorola and Symbian. ActiveSync is designed to synchronise mobile devices of all flavours with Microsoft desktop applications.

Exchange also happens to be the corporate e-mail market that push e-mail vendors are most focused on (see Figure 1). All are active in that market and, for some, such as Good Technology and Nokia, it's their sole focus for now. So having Microsoft, the maker of that server technology, offer a free extension to it that purportedly does everything that established push solutions can do poses a serious challenge – as long as Direct Push can live up to its hype, which many in the industry doubt.

Figure 1: E-mail server markets targeted by push e-mail vendors

Vendor	Corporate e-mail servers supported				
	Microsoft Exchange	Lotus Notes Domino	Novell GroupWise	POP3	IMAP
Ericsson	Yes	Yes	No	Yes	Yes
Extended Systems	Yes	Yes	Yes	No	No
Good Technology	Yes	Planned	No	No	No
Intellisync	Yes	Yes	No	Yes	Yes
JP Mobile	Yes	Yes	Yes	No	No
Nokia	Yes	Planned	No	No	No
Notify Technology	Yes	No	Yes	No	Yes
RIM	Yes	Yes	Yes	Yes	Yes
Seven	Yes	Yes	No	Yes	Yes
Visto	Yes	Yes	No	No	No

Source: Mobile Messaging Analyst

Nokia is positioning its product as much more than a mobile e-mail application. NBC is designed as an all-purpose middleware platform that can be scaled up to mobilise other corporate applications. In that respect, it's competing with the likes of Intellisync, Extended Systems and Good Technology, which already have a big head-start.

Driving handset sales can be seen as the ultimate aim behind Microsoft's and Nokia's push e-mail strategies. Microsoft has been unable to translate its global lead in desktop operating systems to handheld devices. Only about 17% of smartphones currently run Microsoft operating systems. Device sales are at the heart of Nokia's earnings logic, meanwhile, and its main strategy in the enterprise space is to make its smartphones the "device of choice" of business. This explains why Nokia also licenses the push technologies of the likes of RIM, Visto and Seven to incorporate into its handsets – because it doesn't want to miss out on the market momentum already built up by these services. It will also incorporate the Direct Push service through the ActiveSync client it licenses from Microsoft.

Nokia will have to fight it out with the rest of the push e-mail pack for the market slice left beyond what RIM and Microsoft can capture. End-user numbers are hard to come by from RIM's competitors, so it's hard to gauge what share of the market each one has managed to gain so far. The only exceptions are Intellisync and Extended Systems, which claim more than 500,000 and 400,000 respectively. If true, that would leave a very small share indeed for the remaining players. But this all depends on what the total market size is taken to be.

Q: Will the two giants, together with RIM, sideline everyone else?

Guillermo Escofet: Other vendors such as Visto, Seven and Good can certainly not be written off. Visto captured the biggest prize to be won by a carrier-based application provider when it clinched a global deal from Vodafone earlier this year. Seven, meanwhile, now has the widest footprint after RIM following its merger with Smartner. The merger brought together Seven's strong presence in the North American and Asia Pacific markets, including Japan, with Smartner's leading position in the European market.

Good Technology has also strengthened its hand with the acquisition of JP Mobile's capabilities in the Lotus Domino and Novell GroupWise spheres, which will allow it to expand beyond the overcrowded Exchange space. The vendor claims to have 6,500 enterprise customers on its books.

Q: What are the prospects for mobile instant messaging and MMS?

Guillermo Escofet: The messaging services that hold most promise for growth over the next few years won't necessarily bring the greatest returns. A lot is expected of mobile instant messaging, for example, which is forecast to grow at an average annual rate of 102% and 135% between 2005-2009 in the Americas and Europe respectively, according to Informa Telecoms & Media. Yet MMS is likely to be much more profitable, despite it not generating such fast growth. Global MMS revenues in 2009 are estimated at US$22.28 billion, compared with just US$3.23 billion for MIM.

Q: So why the renewed excitement over mobile IM, then? What are the opportunities?

Guillermo Escofet: Mobile Instant Messaging is the most feature-rich of all mobile messaging technologies, bringing together presence, buddy lists, video and voice-over-IP – a compelling package that could quickly spread virally. ISPs are interested in extending their IM services onto mobiles because, unlike on the fixed Internet, mobile-originated IM messages are billable, bringing in a new revenue stream to relieve ISPs' current overdependence on advertising revenue.

For mobile operators, the attraction of MIM is not as clear cut. There's a danger that IM could cannibalise other mobile messaging services, particularly SMS. Some even see MIM as an SMS killer. There's also the fear that MIM clients on phones will act as a Trojan horse, letting in all sorts of free IP-based services that operators will have no control over and will encroach on existing paid-for mobile messaging, content and voice services.

Operators can turn their back on MIM, but then they lose out on the new source of revenue that MIM could bring. There's also the risk that end-users will figure out how to download MIM clients by themselves and set up rogue connections to ISPs behind operators' backs. Alternatively, cellcos can launch MIM and put systems in place to screen out any unauthorized services.

But there are doubts about how well IM will translate to mobile phones. Without a QWERTY keypad users might find it difficult to engage in a fluid IM conversation, for example. Also, IM is not to everyone's liking. And even if mobile users take to it, they might just use it to interact with certain friends or colleagues, but continue to use SMS in other aspects of their lives. It won't be that easy to topple SMS and the culture that has built up around it.

The latest figures to come out of the U.S. – a PC-centric culture where Internet messaging technologies such as IM and e-mail were expected to do better than SMS and MMS – show that MIM usage is lagging behind all other mobile messaging services. In July, 9.6% U.S. subscribers used MIM, compared with 10.4% for MMS, 17.1% for mobile e-mail and 37.3% for SMS, according to a survey by market research firm M:Metrics (see Figure 2). MIM usage grew by only 0.1% from the previous month.

Figure 2: U.S. mobile subscriber monthly consumption of messaging services, July 2005

Activity	Projected monthly reach (000s)	Percent US Mobile subscribers (%)	Change from previous survey (%)
Sent or received text message	67,542	37.30	0.10
Used personal email	20,359	11.30	2.60
Used photo messaging	18,752	10.40	10.50
Used mobile IM	17,375	9.60	0.10
Used work email	10.461	5.80	8.50
Received news and information via browser	24,325	13.40	6.60

Source: M:Metrics

There again, the spread of MIM is being held back by the fact that most phones out in the market are not enabled with IM clients providing a user-friendly experience replicating desktop IM. For MIM to succeed it must tap into existing IM communities on the fixed Internet – it's too hard to try to populate new mobile communities from scratch. It seems like operators have realized this, however, and an increasing amount are teaming up with fixed IM providers for mobile IM.

Q: And what of MMS, the problem child of mobile messaging?

Guillermo Escofet: MMS is the only ubiquitous imaging technology available on mobile networks – and it's likely to remain that way until IMS networks come into being. But operators have got MMS' focus wrong, hence its lacklustre performance so far. The emphasis has been on messaging – sending pictures taken on a mobile phone to family or friends, and only on special occasions. This is not a recipe for driving high traffic volumes.

Part of the problem is that operators have continued to view camera phones as messaging devices, not photography devices. Operators must look at what people use digital cameras for and try to translate that onto mobiles – such as uploading and storing pictures on PCs and printing pictures off. Sprint was ahead of everyone else in realizing this, and focused its Picture Mail service this way from the start. This was partly because the lack of MMS interoperability among U.S. carriers was a big handicap to peer-to-peer MMS messaging; also because it pre-dated Sprint's launch of SMS and its subscribers were not used to the concept of mobile messaging. The U.S. cellco has built up a healthy volume of MMS traffic by encouraging subscribers to upload images onto the network where they can be stored, shown off to others on online photo albums or sent off for printing.

Guillermo Escofet is an Editor

Guillermo has built up significant expertise in the areas of mobile location, mobile messaging and enterprise services. He is an experienced journalist who has worked in business and current affairs journalism in Europe and Latin America.

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Mobile games

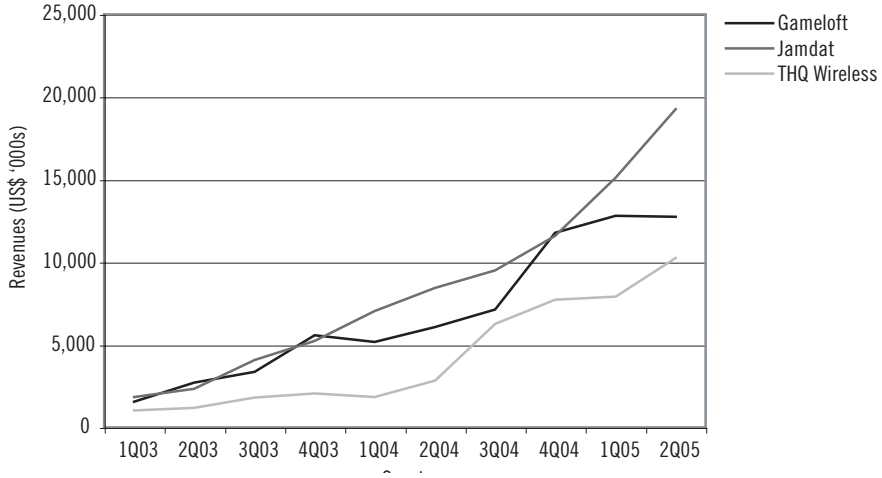
Although somewhat overshadowed by the industry buzz surrounding mobile music and video content, mobile games have been generating significant revenues for operators, publishers and other companies within the value chain. Here, ***Stuart Dredge*** *identifies how fast the games market is growing, the opportunities for consolidation and why Tetris was worth US$137 million.*

Q. What is the size of the mobile games market, and how fast is it growing?

Stuart Dredge: Calculating the exact size of the market is difficult, as operators and publishers still do not release detailed information about mobile games downloads or revenues. However, based on the available evidence, Informa Telecoms & Media predicts that mobile games will generate US$2.6 billion of revenues in 2005, double last year's estimated US$1.3 billion figure.

An accurate gauge of the market's growth is provided by publicly listed publishers, which do declare quarterly financial results (see Figure 1). U.S. firm Jamdat Mobile generated US$36.57 million of revenues in 2004, and expects this to increase to approximately US$80 million in 2005, representing year-on-year growth of 118.8%. Meanwhile, French publisher Gameloft generated €23.2 million (US$28.2 million) of revenues in 2004, which it predicts will increase to €44 million (US$53.40 million) in 2005, or 89.7% year-on-year growth.

Figure 1: Selected mobile games publisher quarterly revenues, 1Q03-2Q05



Source: Gameloft, Jamdat, THQ Wireless

The Asia Pacific region continues to be the largest market for mobile games, particularly advanced territories such as Japan and South Korea. Although Europe is the second-largest

region in terms of revenues, in 2005 the efforts of the large U.S. cellcos have ensured that North America is the fastest growing market for mobile games. Meanwhile, emerging markets such as China, India and Eastern Europe are showing strong growth in download activity, even if revenues have some way to go to match other markets.

However, even in the U.S. there are concerns that mobile games are still a niche activity. Consumer-research firm M:Metrics has been tracking U.S. consumer usage of mobile content and applications since January 2005, and throughout that period, the proportion of consumers who download mobile games has never risen above 3.5%. Informa Telecoms & Media predicts that mobile games could generate US$11.2 billion of revenues globally by 2010, but this will only happen if operators and publishers can appeal to more of the remaining 96.5% of mobile subscribers.

Q. How much more consolidation will there be in the mobile games industry?

Stuart Dredge: The large mobile games publishers got larger in 2005, either through organic growth or acquisition. Examples of the latter include U.S. firm InfoSpace Mobile, which early in the year acquired German publisher Elkware for US$26 million, and UK firm Iomo for US$15 million. Meanwhile, fellow U.S. outfit Glu Mobile bought UK publisher Macrospace in late 2004 for an undisclosed amount, while Jamdat acquired U.S. developer Downtown Wireless for US$5.6 million in January. There have been a number of smaller acquisitions too.

Gameloft, on the other hand, has focused on organic growth, swelling from 432 staff at the end of 1H04 to 1,375 at the end of 1H05. There has been an increase in VC-led investment in the mobile games industry, with firms such as Mforma, Glu and In-Fusio securing funds for global expansion and acquisitions. The market has also seen the entry of major players from other industries, including console publishers (Electronic Arts, Konami and Codemasters) and Internet firms (Yahoo! and RealNetworks).

There is likely to be more consolidation in the industry, both from larger publishers already in the market and from companies that have not yet entered. Selected publishers are likely to follow Jamdat's example and IPO, though they are exhibiting caution in this respect.

Q. Do branded mobile games still take the lion's share of downloads?

Stuart Dredge: Operators have traditionally assumed that branded mobile games sell better than unbranded ones, but evidence is emerging that this might not always be the case. The theory came about because when browsing an operators' games portal, consumers usually base their purchasing decision on the game's title, a few lines of text and a screenshot. Operators and publishers therefore assumed that attaching trusted brands to games was essential.

However, the quality of branded mobile games has been variable, with many leaving publishers open to accusations that they spent more on the licence than on the game itself.

This has been particularly evident for games based on movies, where licensing deals were often signed at the last minute, giving operators little time to produce the game. For example, operators including Sprint and Vodafone have publicly criticised Jamdat's "Lord Of The Rings" game, even though at the time most operators carried it on their games portals.

Operators now realise that offering low-quality branded games does more harm than good, as players will likely not come back to download a second title after one bad experience. For this reason, operators are now more willing to promote unbranded mobile games on their portals, as long as they are of high quality, and publishers are reporting stronger sales figures as a result.

Brands are still important to the mobile games industry, however, especially to operators that expect publishers to invest in co-marketing campaigns. The multi-million-dollar promotional campaigns surrounding movies, console game releases and major sporting events remain attractive to operators. Meanwhile, for publishers who wish to impress the financial community, a stable of strong brands is thought to be essential. Thus, licences such as Star Wars, Doom, King Kong and Halo still reportedly command premium prices.

Q. Is Tetris really worth US$137 million?

Stuart Dredge: Jamdat's decision to acquire Hawaiian publisher Blue Lava Wireless for US$137 million in April 2005 was all about one gaming brand: Tetris.

Blue Lava founder Henk Rogers is also the Tetris IP-owner and, as part of the deal, he granted Jamdat a 15-year exclusive licence to release mobile Tetris games. It is a huge amount of money, but the fact that Tetris generated US$4.1 million of revenues for Jamdat in 3Q05 alone indicates that it may turn out to be money well spent.

So far Tetris is the only mobile game to have topped the sales charts in North America, Europe and Asia Pacific, while its evergreen appeal means it is likely to continue to generate revenues for some time to come – either from the basic version as new consumers enter the market, or from advanced high-score-enabled and multiplayer versions. Perhaps more importantly, Tetris is also a calling card for Jamdat when knocking on the doors of mobile operators, particularly outside its North American base.

Q. Why are casual gamers seen as so important by the mobile games industry?

Stuart Dredge: There is some truth to the allegation that in the past, mobile games were developed by men of a certain age, promoted by men of a certain age, and inevitably appealed primarily to male consumers of a certain age. The operator games portals were stuffed with action/adventure and sports games, many based on existing console game franchises.

Although this has created a viable market, a major trend in 2005 has been the growing realisation that the opportunity for mobile games is much larger than this relatively niche

audience. Sony has sold more than 90 million PlayStation 2 consoles in its entire lifetime. By contrast, Informa Telecoms & Media predicts that 743 million mobile handsets will be sold in 2005 alone.

With that in mind, mobile games publishers are keen to develop more titles that appeal to non-gamers, women and older consumers – demographics that have been under-served in the past. It is hard to generalise about what these 'casual gamers' want to play, but publishers are focusing on producing more puzzle and card games, or action games with simpler, more accessible controls. UK publisher I-play has aggressively promoted its 'one-thumb' games, a genre that several other publishers are also investigating. In the U.S., there has been an explosion in the numbers of poker and puzzle games being developed.

'Build more of these titles, and the casual gamers will come' seems to be the philosophy of many publishers. However, there are significant marketing challenges associated with educating these consumers. Consumers need to know that the games exist, learn how to download them and understand that they won't be ripped off if they do, which is increasingly important given the activities of certain direct-to-consumer mobile content portals.

Q. How fast are connected and multiplayer mobile games rolling out?

Stuart Dredge: In the case of multiplayer, there are now a number of commercially deployed real-time multiplayer mobile games, using either publishers' own proprietary platforms or those of third-party providers, such as Terraplay and Exit Games. Europe and North America are finally clambering onto the multiplayer bandwagon, which was started by carriers in the more advanced Japanese and South Korean markets, with a series of deployments. Nokia has also given the market a boost with the launch of its SNAP Mobile multiplayer platform technology.

However, there is more of a buzz surrounding connected mobile games, which use the connectivity of mobile handsets, but not for real-time multiplayer gaming. Examples of this connectivity include high-score tables on a global, regional or 'buddy' basis, the latter being when players set up a leaderboard solely for their group of friends. Other examples include shadow racing and additional content downloads, where players can download new levels, tracks or other elements from within a mobile game.

These features will become increasingly standard within mobile games, though the North American operators are currently ahead of their European counterparts in this regard. Motricity-owned community firm M7 Networks has deployed its Application Community Platform with U.S. cellcos Sprint Nextel and Cingular Wireless, as well as MVNO Amp'd Mobile, enabling players on those cellcos to post high-scores, rate games and do various other community-focused actions. Sprint's part of the community, Game Lobby, launched in March 2004 and signed up more than half a million players in its first year.

Q. Are 3D mobile games generating a return on investment for publishers?

Stuart Dredge: In certain markets they are, notably Japan and South Korea. In South Korea, operators SK Telecom and KTF have both launched dedicated 3D games portals, GXG and GPANG respectively. The operators have introduced data tariffs allowing users to pay a flat-fee for unlimited data usage, which is important given the large size of 3D mobile games in that market.

Elsewhere, carriers are starting to push 3D games to advertise the capabilities of their 3G networks and the advanced handsets sold alongside them. For carriers, 3D provides a clear selling point for 3G, even if it is not as important as video and music in this regard. U.S. cellco Verizon Wireless has been particularly aggressive with its V CAST service, which by October 2005 had 24 3D games available. Vodafone has also promoted 3D games, and it is fair to say that most mobile operators are now offering some 3D titles, whether over 3G or not.

In the West, only a couple of mobile games publishers – Fathammer and Superscape – have chosen to focus purely on 3D mobile games. Most others are pursuing a parallel 2D/3D development strategy, where 3D games are also released as a 2D version for mass-market handsets, in recognition of the fact that the bulk of mobile games revenues still come from 2D titles.

However, 3D will become more important in 2006, due to the efforts of mobile operators, handset vendors – which are putting software-based 3D APIs into their mass-market handsets, while investigating hardware-based 3D for their high-end devices – and the larger mobile games publishers, such as EA.

Stuart Dredge is an Analyst

Stuart focuses on mobile games and gambling applications, he edits *Mobile Games Analyst*, and has also worked on two volumes of the *Mobile Entertainment* report, co-writing the *Mobile Games* volume, and writing the *Mobile Gambling* volume.

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Commerce and payment

The demise of pan-European initiative Simpay leaves operators looking for simpler payment solutions at a national level, while the Asia Pacific region continues to lead the way in m-commerce with contactless proximity payment solutions. The European market, however, is still waiting for the emergence of an acceptable common standard for m-commerce, say ***Richard Jesty*** *and* ***Dan Winterbottom****.*

Q. What's been happening with m-payments in Europe?

Richard Jesty: The recent dramatic growth in digital content, mostly in lower-value items costing less than €5 (US$6) per transaction, has been driven largely by a variation on the messaging theme – premium SMS (PSMS). This mechanism has proved well-suited to the direct-to-consumer sector of the content market, building on the ubiquitous nature of SMS messaging and its common underlying standards to become the de facto payment mechanism in Europe. However, as the market has grown and as the potential for cross-border traffic has become better understood, the shortcomings of PSMS have become more apparent. It is cumbersome and ill-adapted to higher value payments – a series of SMS messages is not the most convenient way to purchase more expensive goods or services online – and it does not leave an acceptable audit trail making it subject to potential errors and mispayments.

Q: What's happened with the European payment initiative, Simpay?

Dan Winterbottom: Four of the leading operators – T-Mobile International, Orange, Vodafone Group and Telefonica Moviles – joined together in 2003 to found a Europe-wide standard for mobile payments and commerce (see Figure 1). This was the beginning of the Simpay initiative. Backed by some of the most significant mobile players in the region, it promised to offer at least some concerted direction to a segment of the industry that needed standardisation in order to fulfil its potential. There were ambitious plans that included a standardised payment system, which was supposed to have been rolled out to 20 countries in 2004. It was to provide a single platform to deal with the routing, clearing and settling of payments made with mobile phones. The service was designed to be used primarily for small purchases of less than €10 (US$12), but there was potential to use the service for larger payments.

Figure 1: Simpay chronology

Jun-03	The Mobile Payments Services Association (MPSA), the body founded by Orange, Telefonica Moviles, T-Mobile and Vodafone, announces that it is to create a new m-payments brand that "distinguishes the company as a separate entity from its founding members". A new management team is created led by ex-NatWest executive Tim Jones – and Simpay is born. Operators 3, debitel, KPN Mobile group, O_2 and TMN all express interest in joining.
Feb-04	Simpay announces that its first phase will focus on delivering low-value payments under €10 for purchases such as ring tones and games. It forecasts that it will generate more than ?1 billion in mobile-phone-based transactions by 2007.
Apr-04	Simpay selects Encorus, the mobile payments company owned by First Data Corp, as its transaction processor in a multi-year deal covering Europe and the U.S.
Jan-05	Ex-Orange UK executive David Taylor replaces Tim Jones as Simpay's CEO. With the technical launch now complete, Taylor is charged with driving the company's commercial launch strategy.
Feb-05	Launch details are unveiled. Simpay says it will debut in the Spanish market in "mid-2005," with launches in Belgium and the UK in the final quarter of the year. Simpay claims the rollout will enable 70 million mobile subscribers to participate in the scheme by the end of the year. Two new operator members are announced: Spain's third-largest operator, Amena, and Proximus, the Belgian market leader owned by Belgacom.
Jun-05	Simpay confirms T-Mobile's departure in a short statement, adding that its operations will be "scaled back with immediate effect" and that it will not now "pursue its activity on a pan-European scale."

Source: Informa Telecoms & Media

However, Simpay was severely hampered by a constant stream of delays and June 2005 saw one of the main backers, T-Mobile, withdraw from the group, essentially dealing Simpay a killer blow. The remaining members decided to disband the association to concentrate on creating their own payment solutions. The death of Simpay, an initiative lauded by many, is indicative of the difficulties in running alliances with companies that are essentially rivals.

Q: So what will we have instead and where did Simpay end up?

Richard Jesty: Some industry sources have indicated that the Simpay initiative was overly complex and lacked the scope to be truly successful, focusing entirely as it did on digital payments. In addition, the fact that mobile operators backed it compelled service and content providers to support it, despite any misgivings that they might have had. The fall of Simpay has therefore been seen by some as a potentially good thing, allowing them to openly pursue other options.

It is unlikely that a solution enabling cross-border payments via mobile devices will emerge soon, so the real loser will be the European consumer. It is the companies that would have been Simpay's potential competitors, such as PayPal and third-party payment aggregators and processors, which will likely profit from the situation.

From the perspective of the operators, the most likely outcome of the situation will be that operators pursue solutions that facilitate mobile payment and commerce on a national level. T-Mobile already has a propriety solution in place, a deciding factor in its decision to withdraw. Vodafone has its own version of M-Pay, while in Spain, Telefonica Moviles has the MobiPay platform. Germany has also seen the creation of a localised mobile payments initiative that includes all of the region's mobile operators as well as the central banking association.

It remains unclear what will happen to the Simpay payments-processing platform itself. The members of the Simpay consortium own the intellectual property (IP) for the platform, but they will have to decide how that IP is distributed. Orange have stated that they have no interest in using the platform and this sentiment is likely to be echoed to a lesser or greater degree by the other companies.

Orange has stated, however, that a simpler billing process for content providers is needed and as such, it plans to work with aggregators and the other cellcos to develop a WAP-aggregation model to be offered alongside, or perhaps replace, the current PSMS-aggregation model.

Q: What is the future for premium SMS?

Dan Winterbottom: What is currently expected is a gradual phasing out of PSMS to be replaced first by premium WAP billing (PWAP) and then by a direct-billing system, which will likely utilise some of the protocols and standards that came out of the Simpay project. Another threat to PSMS dominance is the growth of subscription services and the desire of providers to utilise managed payment services that will either increase their share of revenues from the operator, or entirely remove the need to access the operator's billing system at all.

Q: Where is m-commerce making most headway?

Richard Jesty: Many new developments are taking place in the Asia Pacific region, from the advanced markets of Japan and South Korea to the mass-market volume of countries like the Philippines. In Japan, for example, NTT DoCoMo introduced its Felica payment system in 2004 based on the Edy prepaid e-money service. Felica is a joint venture between NTT DoCoMo and Sony formed at the end of 2003 with the aim of developing new services based on a mobile version of the Sony contactless Felica payment card. A key objective of the venture is openness, so that a range of content and service providers, as well as the other Japanese mobile network operators, can participate. Initially the service will focus on small micropayments with an electronic top-up system, making it ideal for applications like ticketing and 'proximity payments' – where a card or mobile phone chip is passed across a contactless reader device.

Felica partners are drawn from five main sectors (see Figure 2): retail, transport, ticketing, membership cards and keycards/ID cards. In the traditional plastic card world, one of the most widely used versions has been the transport payment card, specifically the 'Suica' card from the East Japan Railway Company (operators of the Shinkansen or Bullet Train). About 10 million of these Felica-based cards have been issued, and in addition to enabling payment for train journeys, they allow travellers to make purchases at restaurants, convenience stores and other outlets in and around JR stations. Following a test period in 2005, the mobile version of the service will be launched in January 2006, allowing i-mode subscribers to use their Felica handsets as Suica cards.

Figure 2: Felica partners

Sector	Partner	Application
Retail		
Retail - bricks & mortar	am/pm	Convenience store chain
	Matsumoto Kiyoshi	Drug store chain
	Coca-Cola	Vending machines
Retail - online	Sony Finance International	Music CDs
Transport		
	ANA	Airline services
	East Japan Railway	Train services
Ticketing		
	PIA Corporation (Digigate)	Ticketing machines
	TOHO	Cinema chain
Membership cards		
	Dai-ichi Kosho	Karaoke shops
	Geo Corporation	Video rental chain
	Bic Camera	Consumer electronics stores
	Sega Corporation	Video game machines
Keycard/ID card		
	Hayakawa Estates/ Kasaka Systems	Entry systems
	JCB Co (credit cards)	Office security systems

Source: NTT DoCoMo/Informa Telecoms & Media

In the Philippines, Globe Telecom has signed up just over a million subscribers to its G-Cash mobile wallet service since its launch in October 2004, and is hoping to have between two and three million subscribers by the end of the year. Globe generates revenues from the SMS traffic associated with a mobile transaction, rather than from a usage fee, and does not aim to be a financial institution. Until recently subscribers could only recharge the G-Cash service with cash, but now a number of major credit card companies such as JCB, Mastercard and Visa have joined the scheme. This approach has brought in over 200 retail merchants that enable G-Cash payments, with a dozen commercial banks settling the transactions.

The South Korean mobile payments market is dominated by just three players – Mobilians, Danal and Infohub – which exercise control over the market by ensuring that any new entrant must first gain approval from all of them and also set up agreements with the country's three mobile operators. In a typical usage scenario, when an Internet user wants to purchase online content from a web site, they provide their mobile phone number and citizen ID number to the content provider. The content provider sends the requested purchase information to the mobile payment provider, who in turn validates the user information with the operator. The user then inputs an authentication code received via SMS to complete the purchase.

Q: What does the future hold for m-commerce?

Dan Winterbottom: While there is clearly a lot of mileage in the concept of instant payment for lower-value transactions, the problem seems to be getting the necessary traction in the

marketplace for the service to take off, especially where operators are the prime movers. In countries like Korea, where specialist third party providers have taken the lead, market development has been much more spectacular. As for the banks and credit card companies, the indications are that they are currently playing a waiting game to see which business models, partnerships and technologies come together to achieve a successful result. In terms of technology, there is a considerable amount of support for proximity payments, where a mobile phone is 'swiped' across a reader to complete a transaction. Overall though the decisive factor is likely to be the emergence of an acceptable common standard that will underpin m-commerce in the same way that PSMS has done, especially in Europe.

Daniel Winterbottom is a Senior Analyst

Daniel has authored a number of reports focusing on the mobile entertainment market and the wider mobile content industry, including *Emerging Business Models for Mobile Content* and *Mobile Content and Services*. He is also the co-author of *Mobile Entertainment Applications and Markets*.

Richard Jesty is a Senior Consultant

Richard has worked in research-based IT and telecoms consultancy for 15 years. He has built up an in-depth knowledge of the mobile content and services market. As well as being the lead author of a range of strategic reports focusing on this market, Richard has also carried out a number of consultancy assignments in Europe and the US. Richard is a frequent speaker and chair at international conferences and has made many presentations on the future development of mobile services, and the opportunities for mobile value chain players.

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Section 4
Networks

Wireless broadband wars

The future of broadband wireless is being fought over by three main camps – mobile WiMAX, broadband cellular, and the so-called disruptive technologies. Public Wi-Fi was also an early challenger although now it has, apparently, been stopped in its tracks by the emergence of broadband cellular systems. Here, ***Gavin Patterson*** *and* ***Mike Roberts*** *map the terrain being fought over in the Wireless Broadband Wars and look at the significance of Qualcomm's acquisition of Flarion Technologies.*

Q: What is driving the wireless broadband wars?

Gavin Patterson: The acceleration in convergence between fixed and mobile networks and between mobile and broadband-wireless networks is, on the face of it, being driven by the need to develop new revenue streams.

Fixed-line operators are losing voice minutes to mobile operators,mobile operators are experiencing lower ARPU, and the integrated telcos are looking to make sure their customers buy a full suite of services.

But the driving force is actually a lot more than that just shoring up revenue streams. It is about the very future of the telecoms industry, with fixed, mobile and cable operators all engaged in a gold rush for the broadband customer.

The mobile operators are lagging behind at the moment, but once 3G licensees, and mobile operators in general, are able to offer true broadband-wireless services, Internet access – either fixed or wireless, nomadic or mobile – will become nothing more than a commodity based on cost to the end-user and the relative access speeds.

Q. Aren't mobile operators in a strong position, given their spectrum and infrastructure assets?

Mike Roberts: Yes, wireless spectrum and infrastructure are key weapons in the wireless broadband wars, and mobile operators certainly have choice spectrum and extensive infrastructure.

But the problem is that mobile operator's spectrum, while hugely valuable, is not as exclusive an asset as it used to be, given that major markets have started to liberalise spectrum regulations in a way that will allow operators to offers mobile services in more bands. That includes the traditional fixed wireless bands of 2.5GHz and 3.5GHz, which will be the key bands for mobile WiMAX.

Of course, with both spectrum and wireless infrastructure there is also the issue of cost. Mobile operators in some countries paid a huge amount for 3G spectrum and have deployed relatively expensive infrastructure, which translates into high prices for 3G services. Clearly some fixed and other operators hope to use relatively cheap 2.5GHz or 3.5GHz spectrum combined with relatively low-cost, IP-based infrastructure – notably mobile WiMAX – to undercut 3G prices. However, this is still theory rather than reality given that mobile WiMAX equipment won't arrive until 2006-07.

Q: Who are the main protagonists?

Gavin Patterson: At present, the future of broadband wireless appears to be split into three main camps: mobile WiMAX; broadband cellular, such as HSDPA and 1xEV-DO; and the so-called disruptive technologies, including iBurst, FLASH-OFDM and UMTS TDD (see Figure 1.).

WiMAX, and especially mobile WiMAX, has mainly found favour with fixed-line carriers looking for a way into the mobile market, while broadband cellular systems such as HSPDPA, HSUPA, 1xEV-DO, EV-DO Revision A and, ultimately, 4G are all natural evolutions for mobile operators.

As for the disruptive technologies, all either have or will be tested by most operating groups. But the telecoms industry likes its standards, which might give UMTS TDD the edge over FLASH-OFDM – especially since many 3G licensees were also granted unpaired bandwidth with their licences.

Figure 1: Major broadband wireless technologies

Technology	Available	Mobility	Data rate (Mbps)	Comment
HSDPA	End-05	Yes	14.0	Voice/data
UMTS-TDD	Now	Yes	12.0	Data/VoIP
TD-SCDMA	2006	Yes	2.0	Voice/data
1xEV-DO	Now	Yes	2.4	Voice/data
1xEV-DO Rev. A	End-05	Yes	3.1	Voice/data
802.16d	3Q05	No	40.0	Data/VoIP
802.16e	Mid-06	Yes	15.0	Data/VoIP
802.11a/b/g	Now	Limited	54.0	Data/VoIP
FLASH-OFDM	Now	Yes	3.2	Data/VoIP

Sources: Northstream, Global Mobile

Q. What other standards are involved?

Mike Roberts: Wi-Fi is in an interesting position because operators of all stripes deployed it as a first step into the wireless broadband market, but some mobile operators have started to turn against public Wi-Fi as they roll out cellular broadband technologies.

For example, T-Mobile is launching HSDPA in Germany in March 2006 and says the service will support speeds of 1.8Mbps per user. T-Mobile and its fixed-line affiliate T-Com also have nearly 5,000 public Wi-Fi hotspots in Germany, about 4,000 more than the second-largest operator. But T-Mobile now feels that "our rollout of HSDPA means the window of opportunity for Wi-Fi is closing," according to Stephan Keuneke, product manager for non-voice access at T-Mobile International. "How fast the window closes depends on HSDPA takeup, but we have already slowed our Wi-Fi buildout, and at some point it will stop." Keuneke adds that "we are not talking about closing our public Wi-Fi network, but we certainly see its importance decreasing because HSDPA can potentially deliver a much better end-user experience."

Another example is Verizon Wireless, which in mid-2005 expanded its BroadbandAccess network based on EV-DO in New York City. The operator said that its EV-DO expansion was one of the key reasons why its parent company Verizon decided to close its small public Wi-Fi network in the same area.

Q: Does that mean that Wi-Fi is on the way out?

Mike Roberts: No, but it does mean public Wi-Fi operators will be under more pressure to improve their services and cut prices. We have already seen quite a lot of movement in this direction – for example BT initially charged £80 (US$143) a month for unlimited public Wi-Fi access, but has effectively replaced that tariff with offers of £25 (US$45) a month for 4,000 minutes access and £5 (US$9) a month for 500 minutes. That's a huge cut, particularly given that when BT announced the new tariffs more than 90% of its public Wi-Fi customers used less than 500 minutes a month, according to Chris Clark, CEO of BT Wireless Broadband.

Q: Where do the vendors stand on WCDMA versus WiMAX?

Gavin Patterson: Until recently, one of the few things Nokia and Qualcomm could agree on was that alternative broadband-wireless systems were unnecessary for mobile operators once ubiquitous broadband cellular networks became available.

However, vendors also have to sell their wares to make a living so perhaps it shouldn't have been so surprising that in June 2005 Nokia then teamed up with Intel, the driving force behind WiMAX, while Qualcomm later acquired Flarion Technologies for US$600-805 million.

Kai Konola, director of strategy and business development at Nokia Networks, claimed Nokia's move into WiMAX was because WiMAX had begun to take shape as a 'serious contender'. "But if you're looking for a good fight, the contest between WCDMA and WiMAX isn't it," he said.

Konola said the relationship was likely to be much more complementary – adopting the 'friend' rather than 'foe' stance. "Evolved versions of WiMAX present an opportunity for service

providers to maximize broadband wireless access. WiMAX IEEE 802.16e will offer increased portability of broadband Internet access," he said. "The e-version of WiMAX complements 3G. It enables a number of applications, such as last-mile broadband connections, hot spots and high-speed enterprise connectivity that do not directly compete with 3G at all."

Q: What is the significance of Qualcomm's acquisition of Flarion?

Gavin Patterson: WiMAX is based on OFDM, and Flarion – via FLASH-OFDM – is the leading developer of OFDM access technology, claiming to own more than 100 patents that relate to how OFDM can be deployed in a mobile environment.

At the time of the acquisition, Jeffrey Belk, Qualcomm's senior vice president of marketing, said Flarion also believes it holds key IPR pertaining to mobile WiMAX. If it is correct, Qualcomm may be able to influence the pace of the 802.16e standard's commercialisation – an advantage that major telcos have been clamouring for.

Qualcomm also claims the acquisition would help it incorporate OFDM and OFDMA technology into its product line, including its EV-DO platinum multicast and MediaFLO service, an OFDM-based Forward Link Only network that provides capacity for operators to deliver multimedia services via wireless broadband.

Q: Could Qualcomm buying Flarion impact the 802.20 draft standard for mobile broadband?

Mike Roberts: Flarion was one of the main backers of IEEE 802.20, but the standardization process was stalled by Qualcomm and a few other major players that saw Flash-OFDM as a threat to their CDMA-based systems.

But now that Qualcomm and Flarion are on the same side, there are signs that they will try to revive the 802.20 standardization process. That could give them an alternative route to standardizing their OFDM-based systems, which could be important given that the 802.16e mobile WiMAX standard is largely complete. But of course Qualcomm's competitors will now be paying very close attention to 802.20 standardization, and may even try to stall the process given that there could be significant overlap between 802.16e and 802.20.

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Mike is responsible for Informa Telecoms & Media's Wi-Fi and Broadband research element. He has been tracking and reporting on developments in breaking wireless technologies – including 3G, Wi-Fi, Broadband – for several years and is regularly called up as a leading authority to present at international conferences.

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Fixed-mobile convergence

The lion's share of activity surrounding FMC is coming from carriers with both fixed and mobile operations, says ***Paul Lambert****. But* ***Rob Gallagher*** *says that fixed-only operators have the most to gain from offering FMC services or, at least, the most to lose if they don't.*

Q: What exactly is fixed-mobile convergence (FMC)?

Rob Gallagher: There is still no single definition of FMC, despite the term having been bandied about by operators and vendors for several years now. By mid-2005 nearly 30 operators, ISPs and MVNOs had announced so-called 'FMC' launches or trials, or publicly expressed strong interest in the concept, but were far from agreed on the services or technologies that would be involved.

At its most basic, FMC could describe the bundling of fixed and mobile subscriptions with, say, linked or unified billing. Another strategy, being pursued most notably by France Telecom and Deutsche Telekom, is to offer subscribers the same services regardless of whether they are using a fixed or mobile connection, such as a single number, voicemail and address book as well as access to the same music, video and other content.

The approach being pursued by most telecom service providers, including France Telecom and Deutsche Telekom involves a single device that can make voice or data calls, or both, over fixed and mobile networks. A prime example is BT's Fusion service, which offers a mobile phone that can make calls over the UK incumbent's DSL network when in range of special Bluetooth access points and over the mobile network of its MVNO partner Vodafone elsewhere.

This is also the model being promoted by the BT-led Fixed-Mobile Convergence Alliance (FMCA), which is largely aimed at convincing vendors that there is scale for producing FMC products. The FMCA aimed to produce an 'industry standard definition of FMC services' for publication in 4Q05. However, it remains to be seen whether this definition will favour the FMCA's largely incumbent membership to the exclusion of mobile-only operators and new entrants, such as Skype and Vonage, whose own FMC plans could undermine them.

Perhaps the most significant form of FMC is not between fixed and mobile networks and services, but between fixed and mobile operators. Over the past few years, both France Telecom and Telecom Italia have retaken control of their mobile operations, while Ireland's eircom and PCCW of Hong Kong have both acquired mobile operators. BT and a number of alternative broadband operators, meanwhile, have entered into MVNO agreements to launch their own-brand mobile services.

Q: Why are network operators interested in FMC?

Rob Gallagher: Fixed-only operators have the most to gain from offering FMC services – or at least the most to lose if they don't. Fixed-to-mobile substitution (FMS) is showing no signs of slowing, with an increasing number of users not only making more mobile calls at home or in the office, but also choosing to not take out fixed-line subscriptions at all.

Fixed operators hope that FMC services will drive this traffic back on to their fixed networks as well as encourage customers to take out or keep subscriptions for broadband, which will be their main source of growth. In addition, FMC can enable fixed operators to offer a superior service to their mobile counterparts, by routing calls over the fastest connection available. BT, for example, claims Fusion offers better voice quality than GSM when in range of the service's special wireless access points. FMC technologies also enable operators to offer high-margin mobile data services in the home or office at far greater speeds than 3G, but potentially at lower cost by routing them over fixed networks. Many operators are confident that the mere bundling of fixed and mobile services will be compelling enough to attract subscribers as well as reduce churn.

Paul Lambert: The lion's share of activity surrounding FMC is coming from fixed-mobile operators, we have yet to see a wave of agreements from pure-play cellcos seeking to enter the fixed market to offer fixed-mobile services. Still, it would be natural for a cellco that sells mobile access to a fixed operator to seek a reciprocal deal for fixed access. Vodafone may be expected to pursue such a deal with BT in the UK for fixed access, given that it already sells mobile access to BT, although some observers suggest that mobile-only operators will pursue aggressive FMS strategies for as long as possible. Similarly, in Japan, Vodafone is understood to be in talks with fixed line operator Japan Telecom (which it once owned) to form a joint venture to offer FMC, where rival NTT DoCoMo is also thought to be eyeing FMC in conjunction with NTT Communications.

Cellcos considering FMC are doing so for a number of reasons, not least to meet head-on the threat from fixed operators moving into cellular territory via MVNO agreements to offer unified services. Mobile operators are also looking at FMC to provide better in-building coverage, which is often poor, and which is even more challenging to provide with WCDMA technology.

Pure-play cellcos risk increasing churn if unified service delivery becomes high on end-users' list of priorities if and when the benefits of FMC become more palpable to end-users. At the same time, pure-play cellcos signing deals with fixed operators for MVNO access obviously benefit from FMC without the need to strike reciprocal deals with them for fixed access, enjoying as they do additional revenue from fixed operators for mobile access, as well as swelling the number of subscribers a cellco can call 'its own.'

Q: What are the key FMC technologies?

Rob Gallagher: It's safe to say that the market is fairly fragmented. The FMCA is pushing vendors to produce three main technologies: Bluetooth cordless telephony profile (CTP); Wi-Fi UMA (standardised by 3GPP as GAN); and Wi-Fi SIP. Bluetooth CTP is the least sophisticated and viewed as offering the best means for operators to launch FMC services fastest, enabling voice calls to be made over fixed networks via Bluetooth which drop when the user is out of range. UMA enables operators to provide all GSM mobile services over Wi-Fi or Bluetooth, essentially by 'tunnelling' a GSM connection through the fixed network. SIP, in conjunction with the 3GPP-standardised IP Multimedia Subsystem (IMS) core network architecture, promises a more versatile form of FMC, linking handsets, laptops and any other IP devices over any IP network including emerging wireless broadband technologies, such as WiMAX.

While many operators would ideally likely to deploy SIP- and IMS-based FMC systems, they accept that UMA will be the only standardised FMC technology available in the mid-term. Even BT, UMA's principal proponent, plans to migrate its FMC services to a SIP-based platform in 2008. Others such as BellSouth and France Telecom are believed to have developed hybrid architectures mixing UMA, SIP and IMS.

A number of operators, ISPs and MVNOs are also known to be trialling 'pre-IMS' FMC systems from vendors such as Bridgeport Networks, Outsmart and Tatara Systems, which claim that their proprietary products offer a smoother migration path to IMS than UMA.

In addition, a number of existing mobile technologies can be used to provide services which arguably could be termed FMC. Start-up Coffee Telecom plans to deploy around 5,000 small or 'pico-cell' GSM base stations in offices and public places in the UK offering its subscribers cheaper calls when in range, provided it is awarded a licence to operate such services in small band of GSM spectrum, known as the guard band. Sweden's Spring Mobil and in&phone of Switzerland already offer similar services to enterprises, while vendor ip.access is developing a GSM pico-cell for use in the home for launch in 2007 at US$200.

Q: What are the challenges facing FMC?

Paul Lambert: Aside from the inevitable technological challenges facing FMC, operators need to think about how they can position to grow revenues and subscribers from FMC. From a pure-play cellular operator's point of view, the main challenge faced in pursuing FMC is signing a deal with a fixed operator for access to the fixed network or investing in the capital-intensive task of building their own network through local loop unbundling.

But in assessing whether to enter the fixed market, a cellco would need to consider whether it could better increase revenues and retain high-end users through deploying emerging mobile technologies such as HSDPA, which offers data transmission speeds comparable to fixed broadband.

Cellcos are hoping that technologies such as HSDPA and EV-DO will enable them to continue the march of FMS and take on fixed broadband service providers for consumers' home Internet usage, charging a premium to end-users through so doing. Indeed, given that a significant proportion of fixed broadband users only take out a fixed-line subscription in order to have broadband access at home, the chances of success in dislodging ISPs' current dominance of the broadband market through advanced wireless technologies seem good. In Germany, Vodafone and O_2 already market Wi-Fi access points that use their 3G networks for backhaul as an alternative to fixed residential broadband. The two operators also offer services that use location-based technology to allow subscribers to make cheaper mobile calls within their homes.

Cellular operators have also invested significant sums in building their brand image – in which they have a clear lead over fixed-line service providers – and they may baulk at being too closely associated with them, fearing any dilution of their brand image which could loosen the ties of identification they feel they have built up with their customers.

Still, if FMC becomes important for end-users the danger facing pure-play cellcos without a fixed capability is significant, in that they would be edged increasingly toward the low end of the market currently occupied by MVNOs. If FMC gains traction, pure-play cellcos risk a high level of revenue erosion as high-end subscribers churn to operators that can offer FMC.

Indeed, the prospect of signing up with one operator for both fixed and mobile services is compelling. For integrated operators the challenge they face in growing subscribers and revenues from FMC is how to convince end users that unified services are greater than the sum of their parts. To do this, such operators need to ensure the technology underlying FMC enables them to offer seamless access to personalised services across disparate networks. In this way, integrated operators could be expected to enjoy a degree of churn of high-end users to their networks, as well as significantly enhancing the stickiness of services offered.

Yet another challenge facing uptake of FMC is an escalation in the complexity of tariffs resulting in a myriad of pricing options that leaves end users confused and opting out of the services available to them. The industry has already witnessed this phenomenon in the areas of roaming, leading many consumers leaving their mobiles at home when leaving the country because they are unsure how much using it will cost them.

Q: Is FMC really set to take-off?

Rob Gallagher: Let's not forget that FMC is nothing new, despite BT's claims that Fusion is the world's first 'true' FMC service. BT in fact launched a near-identical service in the UK in 1999 that used the cordless phone technology DECT rather than Bluetooth, but abandoned the service citing high equipment costs and competition from mobile operators. Similar plans

by Deutsche Telekom, Telekom Austria and Swisscom also failed to come to fruition. Fusion's launch, meanwhile, was repeatedly delayed by BT due to problems related to vendor backing.

The FMCA claims that such problems have been solved, forecasting that more than 20 convergence-enabled handsets will be launched in 2006 from tier-one vendors such as Motorola, Nokia and Samsung. Meanwhile, a service launched by South Korean operator KTF similar to BT's Fusion gained over 100,000 subscribers within months of being actively marketed in May 2005 and is generating additional voice minutes. BT also received over 20,000 pre-registrations for its Fusion service, following its soft-launch in June 2005. However, analysts warn that early adoption of FMC will be slowed by the scarcity of dual-mode handsets, which are not expected in volume until 2007.

Figure 1: FMC strategies: selected operators

Operator	Country	Operator type	Service	Description	Technologies	Status
BT	UK	Fixed incumbent, MVNO	Fusion	Enables users to make mobile calls (but not data calls as yet) using Bluetooth-enabled mobile phones which seamlessly handover to Bluetooth access points connected to BT broadband connections	GSM, Bluetooth UMA	Fully launched end-September 2005
Korea Telecom	South Korea	Fixed incumbent, mobile	OnePhone	Enables users to make mobile and data calls using Bluetooth-enabled mobile phones over Korea Telecom's broadband network via Bluetooth access points, albeit without seamless handover	CDMA, Bluetooth CTP, Bluetooth IP	Fully launched May 2005
BellSouth/ SBC/ Cingular	US	Fixed incumbent/ fixed incumbent/ mobile	n/a	Enables users to seamlessly transfer mobile calls made with dual-mode cellular/Wi-Fi phones over BellSouth's and SBC's fixed networks	GSM/EDGE, Wi-Fi UMA /IMS hybrid	Enterprise trials 1H05, consumer trials 2H05
Freenet	Germany	ISP, MVNO	ip1	Enables users to make data calls using Bluetooth-enabled mobile phones over Freenet's broadband network via Bluetooth access points using a proprietary Alcatel system, albeit without seamless handover	GSM, Bluetooth CTP, Alcatel Intelligent Mobile Redirect (IMR)	Summer 2005 launch to postponed to autumn 2005, due to the handset failing GSM certification
Bell Canada	Canada	Fixed incumbent, mobile	n/a	Enables users to access Bell Canada's fixed and mobile services via one handset, one number and mailbox using a proprietary system from Bridgeport Networks	CDMA, Wi-Fi pre-IMS	Trialled 1H05

Source: Telecom Markets

Moreover, operators' FMC offerings may not be the only options open to users. Businesses and consumers may in fact build their own FMC services using a growing number of separate components such as dual-mode cellular/Wi-Fi smartphones, VoIP services and IP-PBXs, taking only commoditised mobile airtime and broadband connections from operators.

For example, Avaya, one of the world's largest enterprise telephony vendors, is developing FMC systems with Nokia and Motorola that enterprises will be able to run without having to directly involve operators. VoIP upstart Skype, meanwhile, is working with Motorola on handsets with its service pre-installed as well as preparing versions for the Windows and Symbian mobile operating systems, which could provide the basis of individuals' FMC services. Indeed, the spread of fixed-VoIP services alone may be enough to put some users off FMC services. BT, for example, prices fixed calls for its Fusion service at a similar level to its PSTN charges. A number of UK VoIP providers, however, already offer free calls between their subscribers, unlimited calls to national landlines for a monthly flat-fee and discounted mobile and international calls.

Rob Gallagher is an Editor

Rob has been writing about the ITC industry since 2000. He is a regular speaker at industry events and has contributed to industry publications and wider media.

Paul Lambert is an Editor

Paul Lambert is the editor of *Global Mobile*. Paul has been covering the wireless industry with Informa Telecoms & Media for five years. He has worked across a variety of news publications, including *Global Mobile Daily* and *3G Mobile*, and was the launch editor for *Eastern Europe Wireless Analyst*. Paul has also contributed to analyst reports, providing an in-depth view of the trends and issues that shape the wireless industry.

Fixed Mobile Convergence USA Event 9th and 10th March 2006

FMC Congress USA is a 2 day conference with a pre-conference day on the "Opportunities offered by Voice over WLAN". The event will complement the market leading event held annually in Europe which has attracted a high level of international delegates and speakers.

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WiMAX

Fixed and start-up operators want to use mobile WiMAX to take on mobile operators, but first they need spectrum and equipment, says ***Mike Roberts****. Even then, the WiMAX standard is so diverse that it could end up creating a series of related, but distinct, equipment markets, making it hard to compete with rival technologies such as WCDMA with HSDPA.*

Q: What's the current status of WiMAX?

Mike Roberts: The WiMAX market will become a reality when the first certified equipment hits the market, the industry thinks that will be by end-2005 or 1Q06. The WiMAX Forum started interoperability testing for 802.16-2004 equipment in August. Although it says that the first equipment labelled as "WiMAX Forum Certified for IEEE 802.16-2004" will arrive by year-end, some vendors say the process may take a little longer than expected, leading to equipment appearing in 1Q06. In any case, operators are already announcing plans to launch services next year using 802.16-2004 equipment.

Mobile WiMAX is at an earlier stage. The IEEE 802.16e standard for mobile WiMAX should be finalized by end-2005, which means the WiMAX Forum interoperability certification programme could launch by end-2006, leading to certified equipment hitting the market in early-2007, which means operators could be launching 802.16e services in mid- to late-2007.

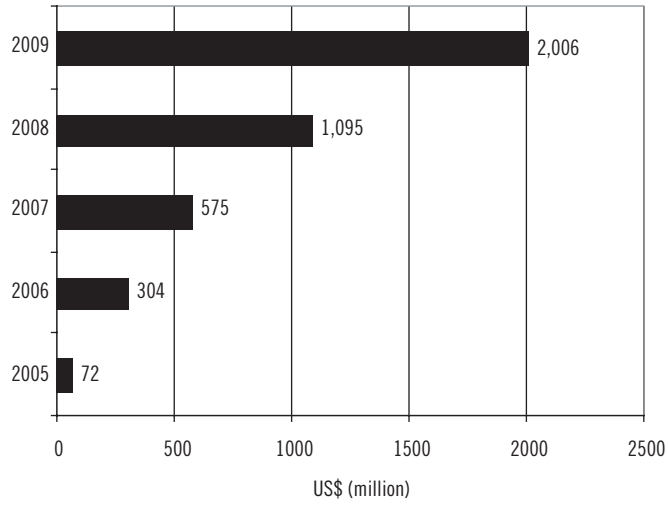
Q. Is WiMAX going to be a significant market?

Mike Roberts: The fixed WiMAX market will be a niche market, much like the traditional fixed wireless market has been, with operators deploying it mainly in areas that are not served by fixed broadband infrastructure. Mobile WiMAX will be a much bigger market because operators are looking to deploy it in major metropolitan areas to complement or compete with cellular services.

This is reflected in vendors' WiMAX strategies. In fixed WiMAX, many major vendors have decided to resell equipment from smaller players such as Alvarion or Airspan, rather than investing to develop their own product lines. For example, Alcatel, Siemens and Lucent have partners with Alvarion for 802.16-2004, and Ericsson, Fujitsu, Marconi and Nortel have partnered with Airspan. But in mobile WiMAX all the big vendors are making substantial investments in product development and are often setting up new divisions focused largely on mobile WiMAX. Motorola has gone farther and decided focus all its attention on mobile WiMAX, which it says it will develop as both a mobile and fixed platform.

As far as the scale of the market goes, estimates vary but Forward Concepts recently forecasted that worldwide sales of WiMAX equipment will jump from US$72 million in 2005 to more than US$2 billion by 2009 (see Figure 1).

Figure 1: WiMAX worldwide equipment revenue forecasts



Source: Forward Concepts

Q. What's the difference between WiMAX and WiBro?

Mike Roberts: WiBro is basically South Korea's version of mobile WiMAX. Technically WiBro is a sub-set of IEEE 802.16e, but there are some differences that mean the standards are not interoperable. WiBro operates in the 2.3GHz band while mobile WiMAX focuses on the 2.5GHz and 3.5GHz bands and the standards have slightly different ways of supporting mobility.

Commercially the main difference is that Samsung is the driving force behind WiBro and Intel is the driving force behind WiMAX. Samsung and its partners aim to be the first to market. They worked with standards body ETRI to develop WiBro by selecting relevant parts of the IEEE 802.16e standard and tailoring them to the South Korean market.

Then in January 2005 Korea's Ministry of Information and Communications announced that it had awarded WiBro 2.3GHz licences to KT, Hanaro Telecom and SKT. The licences cost the equivalent of US$113-122 million and require each operator to invest some US$1 billion on infrastructure, although Hanaro and SKT announced an infrastructure sharing deal shortly after licences were awarded.

The big news came in May, when fixed broadband provider Hanaro announced that it was handing back its WiBro licence to the government. At the time an executive at the operator told Informa Telecoms & Media that "we're unsure whether WiBro would be able to square

up against a strong HSDPA offering," which led the group to "focus our resources on our core broadband and voice businesses."

SKT, which operates HSDPA services in South Korea, has also reportedly frozen its development work on WiBro, although it has not gone so far as to hand its licence back to the government. This has not been confirmed by SKT, but it certainly suggests that WiBro and mobile WiMAX face plenty of competition from established mobile services based on HSDPA and other technologies.

However KT remains bullish about WiBro and plans to launch services in Seoul in April 2006 and hopes to have full nationwide coverage by January 2008.

Q. Are any other operators taking WiMAX seriously?

Mike Roberts: The word from vendors is that all major operators worldwide are trialling mobile WiMAX. In general, mobile operators want to figure out how it could compete with their existing and planned services, while fixed and startup operators want to see how they can use it to launch mobile broadband services.

For example, Sprint Nextel, the largest holder of 2.5GHz spectrum in the U.S., is trialling mobile WiMAX in cooperation with Intel, Motorola and other vendors. But the group is also trialling WiBro equipment from Samsung and WCDMA TDD from IP Wireless. In addition, Nextel ran a large-scale commercial trial of Flash-OFDM equipment from Flarion. The operator was reportedly planning to deploy the technology until it was acquired by Sprint, which favours only standards-based technology.

Other major operators that have announced WiMAX trials include BellSouth, BT, France Telecom, TeliaSonera and T-Com, to name a few.

Q. Have any operators committed substantial resources to WiMAX?

Mike Roberts: For incumbents it's too early to say, since they will wait for certified equipment before announcing major deployments. But one start-up operator that plans major investments in the sector is Clearwire, which was founded by cellular pioneer Craig McCaw and launched wireless broadband services in the U.S. in August 2004.

The operator raised US$260 million in funding from 31 undisclosed investors and reportedly has an option to double the amount to US$520 million. In March, Clearwire landed US$100 million in funding from Bell Canada as part of a strategic partnership through which Bell Canada will offer its VoIP service on Clearwire's pre-WiMAX network in the U.S. In October 2004 Clearwire secured an undisclosed investment from Intel Capital, this was in addition to the undisclosed funding provided by McCaw.

Clearwire has already started using the funds to expand outside the U.S. The group, which is quietly doing deals throughout Europe to acquire spectrum, launched wireless broadband services in Belgium in May and plans to launch services in Denmark by end-2005. It is also developing services in Ireland and is reportedly planning services in Germany, Italy and elsewhere in Europe.

Q. What sort of applications will WiMAX support?

Mike Roberts: According to the WiMAX Forum there are five key applications to watch out for: e-mail/web browsing, file transfer/media downloads, VoIP, streaming media and interactive gaming.

If that list of applications sounds familiar it's because WiMAX is mainly a replacement for a wired connection. In other words, subscribers are likely to use it for the same applications that they already use on their home or office broadband connection. In that respect WiMAX is similar to Wi-Fi.

Q. What are some of the main challenges facing the WiMAX industry?

Mike Roberts: One of the main challenges will be to actually fulfil the basic promise of WiMAX to get the industry to focus its resources on a common standard, which will lead equipment volumes to increase and prices to drop. The problem is that the WiMAX standard is so diverse that it could end up creating a series of related but distinct equipment markets, which means that WiMAX will have a very hard time competing with rival technologies such as WCDMA with HSDPA.

For example, the industry has already quietly abandoned one of its initial goals, which was to make mobile WiMAX backward compatible with fixed WiMAX. This is largely because mobile WiMAX is based on OFDMA while fixed WiMAX uses ODFM. This means the two markets will remain separate, although vendors say the mobile WiMAX market will be large enough on its own to generate scale economics.

WiMAX is also diverse in other ways. Just taking mobile WiMAX, it can operate in licensed bands at 2.3GHz, 2.5GHz, 3.3GHz and 3.5GHz, and equipment designed for one band will not easily or cost-effectively operate in another. Mobile WiMAX can also operate in either FDD or TDD modes, and with a wide variety of channel bandwidths, including 1.25MHz, 3.5MHz, 7MHz, 8.5MHz, 14MHz, 17.5MHz and 28MHz. Again, if vendors end up having to make different versions of their equipment to support different modes and channel widths, they will not achieve the scale economics they need to compete with established global technologies such as WCDMA and CDMA2000.

Of course the WiMAX Forum is aware of these challenges and is working to get the industry focus on a limited number of bands and channel bandwidths, among other things. For

example it is focusing its mobile WiMAX activities on the licensed 2.5GHz and 3.5GHz bands and in the latter it is focusing on FDD mode running in a pair of 3.5MHz channels.

Q. When are we likely to see mobile WiMAX handsets?

Mike Roberts: Several major handset vendors reportedly plan to launch their first WiMAX handsets in 1Q07. Intel's official line is that it will launch chipsets for mobile WiMAX in notebook computers in 2006 and for PDAs and handsets in 2007-08.

However Samsung could be on track to launch WiBro handsets in 2006, given that KT plans to launch WiBro services in April. In fact Samsung recently said that it would have WiBro handsets and PC cards ready by November 2005, when it planned a trial with 500 end-users.

Most vendors are planning dual-mode handsets running both WiMAX and a cellular technology (or WiBro and a cellular technology), since WiMAX-only handsets would have limited coverage and usefulness.

Mike Roberts is a Principal Analyst

Mike is responsible for Informa Telecoms & Media's Wi-Fi and Broadband research element. He has been tracking and reporting on developments in breaking wireless technologies – including 3G, Wi-Fi, Broadband – for several years and is regularly called up as a leading authority to present at international conferences.

WiMAX: The Beginning of a New Era Event 6-7 December 2005, Vienna

This conference will enable delegates to get right to the heart of how WiMAX will actually revolutionise wireless broadband access: What is the best business model for WiMAX? What can be learnt from other deployments? How are standardization and interoperability issues going to affect the market? The event will feature a extensive line up of top level speakers

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3G evolution

__Gavin Patterson__ says the debate over technology neutrality for the 3G expansion bands is one between the free market and the closed shop. Meanwhile, __Julian Bright__ looks at the evolution of WCDMA and CDMA2000 and identifies the common ground that could mean the end of the Technology Wars.

Q: Will the EU's spectrum policy restrict the development of 3G?

Gavin Patterson: No, but the move towards a free-market approach to future spectrum awards certainly has repercussions for the spread of rival technologies, such as WiMAX.

The most pressing issue at the moment is whether or not the 3G extension bands – 2.5-2.69GHz – which were originally earmarked to support IMT-2000 services in Europe are opened up to all-comers.

In essence, though, it is a debate between the free-market and the closed shop. Future spectrum awards are all likely to be on a technology neutral basis, but the extension bands are turning into a fight between European regulators and the industry.

Both operators and vendors claim that adopting a technology-neutral approach to the 3G expansion bands could seriously damage the future of the mobile industry in Europe.

Their basic argument is that opening up the 3G extension bands will lead to a fragmentation of technologies and destroy the economic life cycle of R&D investments of many larger European vendors.

In reality, operators are more likely to fear losing revenues to strong competition from WiMAX, while vendors want to protect sales of WCDMA-based infrastructure. "WiMAX is the technology that has been discussed for this band," said Kai Sahala, head of 3G-systems communications at Nokia Networks.

"We don't see WiMAX as a threat. WCDMA is established in Europe, it's mainstream, and future capacity is the main reason to mandate the expansion bands for IMT-2000. I haven't heard of any good arguments for having technology neutrality yet," Sahala said. "We should keep this allocation. It's fairly straightforward."

The operators rightly point to the billions of dollars they paid for 3G licences and question the legitimacy of 'giving away' spectrum to newcomers. "Those investments have been made under the precondition of obtaining additional sufficient spectrum resources," said Klaus

Czerwinski, global communication coordinator for T-Mobile International. "The UMTS extension band has been always reserved for that purpose."

A fair point! However, many regulators – led by Ofcom in the UK – are coming to acknowledge the benefits of technology neutrality. The main discussion is how quickly they can implement it.

Laws governing the use of the 3G expansion bands in individual member states are expected to be passed by end-2007, while licences are scheduled to be awarded in early 2008.

Q: And will the uncertainty over IPRs have any impact?

Gavin Patterson: The fear is that if the number of companies claiming essential Intellectual Property Rights keeps growing it could push up total royalty payments on WCDMA equipment to between 25% and 30% of the average selling price of a base station, handset or whatever.

Over the next 12 years, IPRs for WCDMA infrastructure equipment and terminals could cost the industry US$80-100 billion based on the cost of an average-sized WCDMA network (US$5-7 billion), excluding towers, planning and installation, and a 'modest' 10% royalty rate.

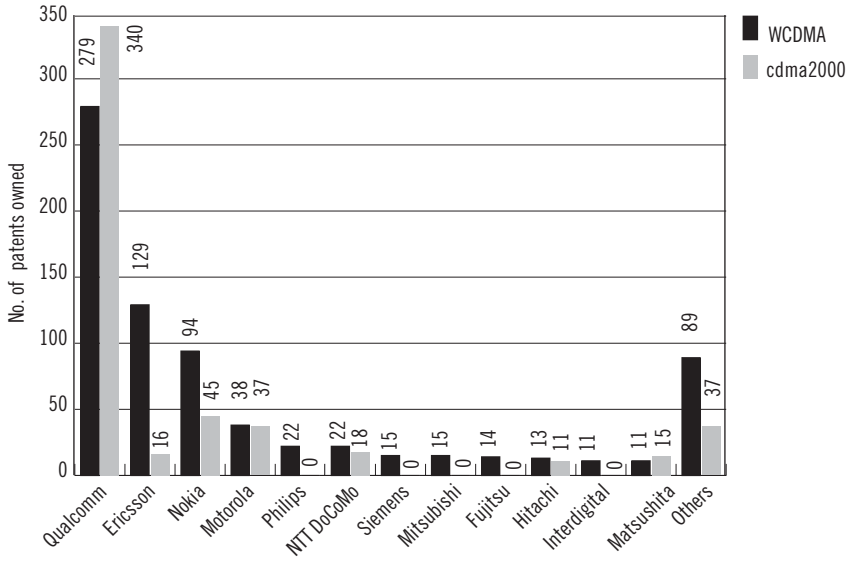
At present, around 40 companies are believed to hold essential WCDMA IPRs, but the move towards multiple radio-access technologies and multimode handsets is likely to see the number of IPRs – and the number of companies claiming ownership of them – sky-rocket.

However, the waters are very muddied as only the lawyers really know which vendors own which IPRs, which are essential, and the royalty rates vendors are charging each other. As a result, operators have already requested that the GSM Association address the situation before it spirals out of control, requesting a cumulative cap on IPRs of 5% – in line with the rate set by the 3G Patent Platform Partnership.

Unfortunately, there is little the GSMA can do to help as its members – the operators – are the principal clients of the vendors and, therefore, have a material interest in seeking a low-royalty regime. As a result, the GSMA cannot be seen to exert its purchasing power to achieve low royalties, since it would risk charges of anticompetitive behaviour.

A Nokia-commissioned study showed that Qualcomm holds the lion's share of WCDMA IPRs (see Figure 1). The study also showed that Nokia owned 25.5% of essential IPRs ahead of Ericsson on 21.65% and Qualcomm on 19%.

Figure 1: Vendors' patents



Sources: David Goodman and Robert Myers

As Qualcomm is already believed to have finalised deals with major industry players at a blended rate of 4.65% – only leaving 0.35% to be shared between all the other essential IPR claimants – the vendors are unlikely to ever wear a cross-industry cap on their own. Moreover, because the largest vendors claim ownership of the largest number of essential IPRs, it makes it difficult for the smaller manufacturers to compete.

For example, in August, 2005, Qualcomm acquired Flarion Technologies in a deal worth up to US$805 million. The attraction of Flarion was certainly not that it had developed a proprietary version of OFDM which had seen limited commercial success. More likely was the fact that Flarion also claimed ownership to more than 100 patents that relate to how OFDM can be deployed in a mobile environment. WiMAX is based on OFDM, while both 3GPP and 3GPP2 are studying OFDM for inclusion in future versions of WCDMA and CDMA2000. These are all the building blocks for the next generation of mobile networks.

Q: So, where to next for Rev. A and HSPA?

Julian Bright: Both the CDMA2000 and WCDMA communities are pressing ahead with their respective next stages of technology evolution.

1xEV-DO Revision A is on track for commercial availability late in 2006, with both Japan's KDDI and South Korean operator LG Telecom having announced plans to begin deploying Rev. A by the year-end. LG is planning a Rev. A trial commencing 2Q06 using equipment from Lucent Technologies.

Cingular will likely be the first operator in the world to launch a commercial HSDPA service, with 15-20 major markets offering service by late 2005. South Korea's KTF also plans to start HSDPA services in the Seoul region by December.

However, others have delayed their plans, with NTT DoCoMo announcing that its HSDPA rollout is now scheduled for September 2006 (previously it was planned for early 2006) to coincide with the introduction of mobile number portability in Japan.

The specifications for HSUPA were finalised in February 2005 with the completion of Release 6 by the Third Generation Project Partnership (3GPP). Lab simulations by chipset supplier Qualcomm, suggest that HSUPA will provide a 50-70% improvement of uplink sector throughput.

Hence, EV-DO Rev. 0 and Rev. A are largely comparable with HSDPA and HSUPA respectively, albeit with a time advantage for CDMA2000 variously estimated at between one and three years.

Rev. A and HSUPA have similar performance characteristics, both technologies addressing issues such as improved latency in the network and allowing operators eventually to offer VoIP and IP-based [not 64kbps circuit switch] video telephony calls.

Figure 2: Forward-link throughput in a 5MHz sector

1xEV-DO Rev. 0	2.4Mbps
UMTS	0.75Mbps
1xEV-DO Rev. A	3.3Mbps
HSDPA	2.5Mbps

Source: Signals Research Group

In September 2005, Lucent and Verizon Wireless announced the completion of what was claimed to be the industry's first over-the-air call using Rev. A. The two companies plan to carry out a more extensive trial of the technology in early 2006, including delivery of VoIP and multimedia applications.

Meanwhile, work is already underway within 3GPP2 to develop and standardize the next phase of EV-DO, known as Rev. B or multi-carrier 1xEV-DO. This could be adopted as a standard as early as 1Q06 and be commercially available in late 2007. Rev. B is even being talked of as a possible competitor to broadband wireless technologies such as WiMAX.

Q: Does 4G mean the end of the Technology Wars?

Julian Bright: To a degree. Some common ground is appearing between the CDMA2000 and WCDMA camps, and it is focussed primarily on two technologies: orthogonal frequency division multiplexing (OFDM) and multiple-input/multiple-output (MIMO).

OFDM is highly spectrally efficient, using digital modulation to split a signal into several narrow-bandwidth channels at different frequencies before it is sent. MIMO uses radio links with multiple antennas at the transmitter and the receiver, to improve the performance of the wireless link. When combined with OFDM, MIMO effectively magnifies OFDM's efficiency tenfold.

The initial strategy for evolved UMTS is to use the two technologies, which have both become associated with 4G. Work within the 3GPP is already well advanced in this area, although the organisation has disassociated itself from the 4G concept in the absence of a consistent definition.

NTT DoCoMo says it has achieved real-time packet transmission at 1Gbps in the downlink whilst on the move, using a technique called Viable Spreading Factor Spread OFDM in a field experiment. The operator claims it can achieve frequency-spectrum efficiency about 20 times that of 3G radio networks with the technology.

The 3GPP says OFDM is a strong candidate for evolved 3G and has formed a working group to look at OFDM for the downlink and uplink, with an eye toward integrating the technology into future releases. Standardization work for evolved UMTS is scheduled for completion by June 2007.

At the same time, OFDM is gaining traction in 3GPP2, and Qualcomm's recent acquisition of Flash-OFDM specialist, Flarion, has highlighted the possibility of incorporating OFDM and OFDMA into future CDMA system development.

At the same time, the industry is already under pressure to identify spectrum for 4G, and each operator could require up to 100MHz when 4G spectrum is allocated at the World Radiocommunications Conference in 2007 and it is not clear whether enough spectrum will be available. Representatives of the major regional standards bodies recently called for the work of the two 3G partnership projects – 3GPP and 3GPP2 – to be incorporated at some time in the future into a single body that will be responsible for developing specifications for systems beyond IMT-2000.

DoCoMo appeared to be taking a lead in WCDMA evolution with what it calls Super 3G; a system overlay, using different spectrums in the same location as today's WCDMA sites.

But, perhaps significantly, China, Japan and South Korea are already co-operating in a regional initiative to develop 4G communications technologies jointly, in a move that challenges EU and US dominance in global standards development. However, whether a collaboration of this kind can finally put an end to the technology wars seems unlikely.

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IMS

Both fixed and mobile operators are increasingly moving towards a single core IP-based network. An IP Multimedia Subsystem provides a service creation environment that enables new services to be deployed quickly while, at the same time, allowing converged and collaborative services to be developed across a range of access networks. Here, ***Julian Bright*** *looks at the barriers facing IMS, when IMS systems are expected to be in place and the benefits they will bring the end user.*

Q: Why is there a need for IMS?

Julian Bright: There are a number of reasons. Operators want to be more creative with services, providing a more appealing mix of personalised and bundled offerings that will attract subscribers and generate new revenues. At the same time they are also under pressure to achieve cost reductions and implement greater efficiency in their networks as revenues from increasingly commoditised voice services decline.

This is driving the creation of what vendors say will be a more efficient architecture where new services can be quickly and easily created and delivered, unlike the operators' old service 'silos' where applications and services were designed and delivered discretely and in an entirely unconnected manner.

The trend towards converged IP networks underpins this trend. Most operators are implementing a single core IP-based network, and the IP Multimedia Subsystem (IMS) sits on top of that, providing a service creation environment that not only enables new services to be deployed quickly, but allows converged and collaborative services to be developed across a range of access networks including GSM, WCDMA, CDMA2000, wireline broadband and WLAN. By providing the ability to deliver services across any access network, IMS also lets operators use the lowest-cost network.

Q: How does IMS work?

Julian Bright: In a number of ways. IMS is based on the session initiation protocol (SIP). The IMS centralizes many common assets and resources near the session control and centralized database layer. One of things it centralises is the user data, so that this doesn't have to be replicated for each user. There are also additional things like user profiles or preferences and buddy lists, which can be easily shared across the various applications.

With a centralised session controller, the operator can also control the session from a central point, which in turn has an impact on quality of service, as the session controller knows what

users are doing and can ensure there's enough bandwidth, for example, to launch an additional service. Applications can easily be plugged in via standardized interfaces, to make use of the centralised resources.

The benefits for the operator of this technology are that IMS enables wireless operators to enter new markets, such as push-to-talk over cellular (PoC) and VoIP; IMS also reduces the level of IT and network-integration work required to bring new services to market by consolidating service-delivery platforms for voice and data. One vendor estimates that IMS can reduce the application integration process by as much as one year.

Q: What benefits will IMS bring for the end user?

Julian Bright: Because IMS uses a common transport and control infrastructure for voice, video and data, it allows operators to offer new combinations of services, allowing these services and applications to interact.

In the short term, IMS will support services such as PoC, which can then be enhanced with features such as presence information and group-calling. Other services to follow will include 'push to X' instant-voice conferencing with simultaneous photo sharing and video sharing, fixed/mobile convergence (FMC), and VoIP/cellular services with managed quality of service.

Many operators believe that demand for IMS-based services will develop first in the enterprise market and then transition to the consumer market. Even so, initial IMS services are expected to include the likes of multiplayer gaming with high-resolution graphics and integrated presence and location. An Ericsson-commissioned study into the likely adoption of IMS-based services revealed that early adopters of services such as push-to-talk, presence and video sharing will be 15- to 25-year-olds.

Vendors are also talking about 'combinational services' or 'blended services' that fit with peoples' lifestyles. They say that these services will be easily personalised, and include easy-to-use features such as a single sign-on capability so that users don't need to register separately for more than one service.

Services should have other benefits, including being 'context aware' thanks to built-in location detection, and be able provide service without the need for the user to know whether the connection is over Wi-Fi, fixed, 3G or any of a range of access networks. Users should also be able to access services from a single device rather than a set of devices.

Q: When can we expect to see IMS systems in place? Also, is handset compatibility an impairing issue?

Julian Bright: Ericsson believes that operators already have the infrastructure in place to begin the migration toward the IMS. Most vendors say that operators are already trialling their IMS technology and many claim to have firm contracts for supply of full or partial

systems (see Figure 1). However, these are early implementations of the technology and the standardization process is still not complete.

Figure 1: Selected IMS contracts

Operator	Infrastructure vendor	Services planned	Launch date
MMO2	Siemens	PoC, multimedia conferencing	End 2005
TIM	Ericsson, Nokia	Video Sharing combinational services (voice, data, video)	Market launch 2Q05, commercially launched
TeliaSonera	Ericsson, Nokia, Siemens	IM, video sharing, gaming among diff. mbile operators	Trial in spring 2005
France Telecom	Siemens	Fixed mobile convergence	
eAccess	Lucent	Multimedia, HSDPA	Dec 2006 (assuming gets licence)
Sprint	Lucent	EV-DO	Deployment starts 2005
Telefonica	Ericsson	Converged wireless/wireline IMS deployment	Late Spring
Saunalahti	Nokia	fixed-mobile converged services	
SK Telecom	Consortium of 31 Samsung and LG	high definition video on demand companies incl.	Dec-05
TMN	Nokia	Video Sharing combinational services(Voice, data, video)	01/06/2005 commercially launched
Softbank	Ericsson		Trial
KPN	Siemens	Siemens chosen as 'strategic IP partner' for KPN's fixed and mobile activities in Netherlands, Belgium and Germany	

Source: Informa Telecoms & Media

Lucent claims to have 50 IMS trials ongoing with 14 different customers, including Sprint PCS, O2 and Shandong Unicom. In the U.S., Cingular Wireless is also deploying the Lucent IMS solution for its 3G offering. Motorola, meanwhile, says it has delivered its IMS-based PoC solution to 41 wireless carriers in 32 countries, on both GSM and CDMA networks.

The IMS standard was developed by the 3GPP. IMS phase 2 was recently finalized as part of 3GPP Release 6, but the standard still takes account of early implementations of IMS, for example, by incorporating support for IPv4 rather than IPv6.

IMS has also been adopted by the standards bodies on the fixed line side such as the ITU and TISPAN, the group within ETSI responsible for converged networks, including VoIP and Next Generation Networks (NGN). The 3GPP2 is also developing an equivalent of IMS which is called MMD.

Handset availability could be a problem with some IMS services, such as push-to-talk, mobile VoIP and video sharing. Most major manufacturers, including Nokia, Motorola and Samsung, have announced plans to provide IMS-compatible handsets, but estimates are that it will be 18 months or more before a reasonably wide assortment of mature handsets reaches the market.

Some IMS features will require handset upgrades but this is likely to be a phased process. Older handsets will initially require enhancements in order to support IMS, and IMS and non-IMS handsets will co-exist in the network for some time.

Q: What are the barriers facing IMS at the current market state?

Julian Bright: One of the major challenges for operators will be achieving the cost-effective and seamless migration of customers from legacy networks onto the new IMS infrastructure. This will need to be thoroughly planned and carefully executed in order to avoid customer dissatisfaction and churn.

Achieving the seamless mobility between different access networks promised by IMS will also be a key challenge and manufacturers are working to test interoperability of pre-standard versions of IMS. Some key areas remain to be addressed within the standards process. For example, current versions of IMS do not support seamless handover of voice calls from cellular networks to WLAN.

Much will also depend on overcoming at an early stage the kind of interoperability issues that dogged services such as MMS. PoC services are currently undergoing interoperability testing that will allow users to communicate across different operators' networks.

Q: What is the connection between IMS and FMC?

Julian Bright: IMS looks like providing a longer term solution to the kind of fixed-mobile convergence approach adopted by operators such as BT with its Fusion service, by allowing operators with both fixed and mobile assets to develop a common architecture for the delivery of converged wireless and wireline services.

As interoperability specialist inCode explains, IMS technology can reduce the cost of providing in-home voice and data services by offloading traffic to 802.11 spectrum and broadband IP backhaul, enabling operators to capture an increased share of household or enterprise communications spending by providing integrated services, such as combined VoIP/cellular or portable broadband.

An earlier approach to FMC is the Unlicensed Mobile Access (UMA) initiative, for which compliant 3G/WiFi handsets are likely to be available in the second half of 2006. An improved handover capability for IMS, termed Voice Call Continuity (VCC), is expected to be standardized around the same time, although the first commercial services may not be available until 2008.

Julian Bright is an Editor

Julian is editor of *3G Mobile Research Service* and has been responsible for launching a number of successful magazines and telecoms publications including *Telecoms World* and *Billing International* for the FT. He is a regular speaker at industry events.

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Section 5
Handsets

Consolidation

The handset market has been very much on the upturn since the worldwide slump at the turn of the century, says ***Dave McQueen****. While the handset replacement market is dominant in mature markets, demanding handsets with better features and greater functionality, it is pent up demand for new handsets that has been growing strongly in the developing markets of Asia Pacific and Latin America.*

Q. How sustainable is the current growth in unit sales worldwide?

Dave McQueen: Informa Telecoms & Media estimates that worldwide sales in 2004 were 649 million, a new sales high and a 23% increase on the 2003 figure. This trend is expected to continue through 2005, as sales are forecast to increase 14% during the year to reach 743 million.

We predict this upward trend will continue for the next five years, although with a much reduced growth rate from 2008, with handset sales forecast to reach 899 million by 2010. For the past four years, Asia Pacific has been the world's largest handset market, with sales estimated at 252.5 million in 2004 – 36% of which were sold in China alone. Far from saturating, growth in the region is expected to increase dramatically over the next five years as penetration is still relatively low. The next largest region in terms of sales is Europe, which saw healthy growth in 2003 and 2004. North American handset sales recovered into 2003 and had reached 76.5 million in 2004.

Growth is anticipated to continue over the next three years, particularly as the region is set to experience a period of extensive network transition and a flood of new handset models. The market in Latin America is also picking up speed, mainly through the large increases in subscriber numbers in what is a highly populated region with low penetration rates. Despite its equally low penetration rates, Africa and the Middle East will lag behind the rest of the world over the forecast period, although some countries will experience solid growth, such as the technologically-advanced countries of Morocco, Egypt, the UAE, Nigeria, South Africa and Saudi Arabia.

Q. What is driving this growth?

Dave McQueen: In the developed regions, the market has paid particular attention to the most popular handset features and supported services and the role each will play in next-generation mobile handset markets, particularly as they become more segmented and complex.

Although the Chinese market is still proving popular, companies are experiencing a considerable tightening of profit margins in the region as it becomes overcrowded, with many vendors now turning to other emerging markets to maintain their strategies for global growth, with focus on areas such as Russia and Eastern Europe, India, southeast Asia, Brazil and Mexico, in many cases with entry-level handsets.

Indeed, entry-level and ultra low-cost handsets will prove to be an evermore important driver for the market into 2006 as the 'third billion' subscribers will be totally different from the first two in terms of consumer expenditure.

Q: With a tightening of margins, how has this changed the dynamics of the industry?

Dave McQueen: As the handset market has developed, competition has intensified at every step of the value chain. The result of this competition has been a need for players at every link of the chain to increase the value their products provide to customers further along the chain and, ultimately, to the end user.

With rising handset production, marketing and sales, and more emphasis on R&D capabilities, there is a whole range of activities in each of these areas that require a different strategy and more resources to sustain growth. The top vendors are improving their efficiency and reorganising their companies for a market that is forecast to grow only in single-digit percentages from 2006 onwards.

This slowing of growth and increasing competition is reducing prices and putting pressure on vendor margins. In an effort to maintain these margins vendors are looking to reduce expenditure and increase efficiency in areas such as R&D and supply chain.

While R&D may allow for some short-term financial stability, all leading vendors recognise that significant investment is needed to develop handsets for future technologies. It is in the area of supply chain management, including outsourcing, where vendors have planned out some cost. However, it is this outsourcing work that feeds the ODM and EMS companies that may become tomorrow's competitors.

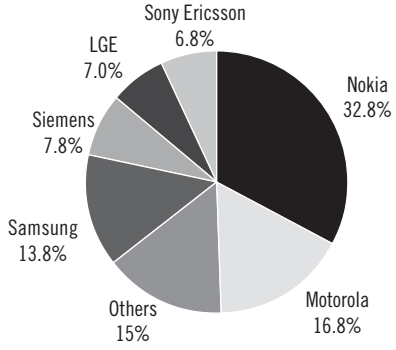
Q: So what has this meant for the top vendors?

Dave McQueen: While overall the market has shown solid growth in the past couple of years, the different vendors have coped more or less well with changing market dynamics. Indeed, the top two vendors – Nokia and Motorola – control 49.6% of the market with the top six representing 85% between them while others fight for the remaining sales (see Figure 1).

These leading companies – Nokia, Motorola, Samsung, Siemens, LG Electronics and Sony Ericsson – are the most widely recognised handset brands. The value of these brands will be some insurance against the increasing price competition and the rise of operator-branded handsets.

Further inspection of this 'top six' in 2004 shows that the gap is widening between the handset vendors with double-digit market share, and the following pack of Siemens (recently renamed BenQ Siemens) LG Electronics and Sony Ericsson. In an environment of reducing margins, economies of scale will become increasingly important, as are controlling costs and segmentation.

Figure 1: Worldwide market share of top manufacturers (%), 2004



Source: Informa Telecoms & Media

Q: With all this growth in the market, why is there consolidation?

Dave McQueen: The handset market is becoming an increasingly competitive and complex area to do business in, with key prosperous markets reaching high penetration levels and vendors that had previously focused on specific regions now pursuing global expansion strategies, it is becoming increasingly challenging for handset vendors and operators to grow and carve out market share. This has meant that vendors have been rationalising, selling divisions and swapping business units, while new entrants are also bursting through from the Asia-Pacific region and building partnerships.

Q: How are traditional vendors fighting their corner?

Dave McQueen: The handset industry has become increasingly competitive in recent years, such that traditional handset vendors now need to identify robust strategies to strengthen their positions or else face dropping from the market altogether.

Handset players have long tried to resist the generic consumer electronics manufacturing outsourcing trend in favour of in-house production, in order to maintain tight control on their products. However, handset market conditions have driven players to increase profit by outsourcing, in the face of tightening margins. After all, developing and manufacturing mobile handsets needs extensive R&D, manufacturing, marketing and sales.

This trend has allowed traditional vendors to efficiently expand product portfolios. The main reasons given for outsourcing are formed from continuous market pressures to streamline the

production process, reduce production costs, such as R&D, manufacturing and testing, exploit design, shorten time-to-market for new products and increase cost effectiveness of handset development.

Also, as handset models are beginning to have a shorter life span with fewer units, and with the added pressure on financial results, the outsourcing model is becoming a compelling argument for survival. However, striking the correct balance between customisation, time-to-market and brand equity is becoming increasingly important in the industry.

Q: What have been the most influential mergers?

Dave McQueen: There have been substantial changes in the handset industry during 2004, which continued into 2005. Panasonic exited North America; Kyocera outsourced part of its production to Flextronics; Sendo was consumed by Motorola, and Mitsubishi exited Europe. In addition Panda and Soutec closed shop in China while Lite-on decided to end its handset ODM business.

The most high-profile mergers have been Alcatel and TCL, and, more recently, the purchase of Siemens' mobile phone division by former lead ODM player, Taiwan's BenQ. The acquisition appeared to be the only way for BenQ to ramp up the long-lost economies of scale, along with other benefits such as access to Siemens' proprietary technology in GSM, GPRS and 3G, its established global brand awareness and its strong sales channels in Europe and Latin America.

However, the BenQ–Siemens union could be compared with the merger of TCL and Alcatel, which has so far failed to live up to its promises.

But consolidation has not just been limited to the handset vendors. Large operators are absorbing smaller players to gain either a wider global or national footprint, especially in the US and Europe.

The last year has seen further expansion of the 'super operators' as they expand across the world – namely, Vodafone and France Telecom, including Orange, T-Mobile, America Movil and Telefonica, and their associated services.

Possibly the most notable of late was Telefonica's acquisition of BellSouth's operations in Latin American. In the US, consolidation is gathering pace, the most significant being that between Cingular Wireless and AT&T Wireless, and, more recently, Sprint and Nextel, which has resulted in just a handful of major national players. The intention in both cases is to expand the network without incurring vast set-up costs and to benefit from economies of scale.

Q: Is this set to continue and are we to expect any further major announcements?

Dave McQueen: Informa Telecoms & Media feels that more vendor consolidation will occur in the handset industry over the next two years. Notably, this will happen in the over-serviced Chinese market, as the increase in competitiveness and large number of players leads companies to seek synergies in research, design, testing, manufacturing, marketing and distribution. However, some of these issues are being overcome through outsourcing in the market, which is helping to slow this phenomenon.

Despite this, growth in own-brand has caused both conflict and competition with OEM customers that has ultimately led to the break-up of many of its ODM relationships, including Motorola, which finally walked away from BenQ at the end of 2004, and Kyocera. Moreover, this may signal a longer-term problem with the viability of the ODM model.

Smaller companies in the handset market are looking to develop and grow their business. While smaller Japanese vendors such as NEC and Panasonic remain primarily focused on supplying devices to their technologically-advanced domestic market, the main short-term threat to the market share of the top six companies comes from large ODM companies seeking to develop branded handsets.

Reducing margins is making scale an increasingly important factor in the handset market. Thus the struggle to maintain and grow market share is one that will undoubtedly see the competitive landscape change in the coming years. Vendors that succeed will be aided in no small way by economies of scale.

In addition, the current market focus on the low-end could have a severe impact on the longer-term dynamics of the industry. Although these low-cost devices are the latest manufacturing trend, the profit margins are very small, putting pressure on the vendors' revenue and income expectations. This questions the continued viability of such a business model and could put the survival of some players in jeopardy.

But what is most evident is that despite the size, market strength and leadership of Nokia, the recent rumours surrounding its acquisition by Cisco, mainly for Nokia's telecoms equipment business, leaves no doubt that all players in the market are ripe for consolidation.

David McQueen is a Senior Analyst and Consultant

David has over 10 years' experience in telecoms research and consulting, with the last five focussed on mobile handset developments and global vendor strategies. Author of the flagship *Future Mobile Handsets* report, he's amassed an unparalleled knowledge of the handset market and has extensive contacts with the world's leading handset manufacturers.

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New features, innovations and technology

Mobile TV, music downloads and better camera functionality are all creating greater demands on battery life, says ***Michael Carroll****. However, development work on fuel-cell technology will help lengthen battery life and thus power a new range of services.*

Q: What will be the most important technology developments in 2006?

Michael Carroll: In some ways it is hard to identify any single technology that has driven the market more than another in 2005, but work to improve battery life is ongoing and has laid the foundations for the launch of new services in 2006.

The bulk of battery development is focused on fuel-cell technology and is being driven by Japanese carriers KDDI and NTT DoCoMo. In 2004, KDDI announced that it would aim to have a working fuel-cell solution ready by the end of 2005, targeting a full commercial introduction in 2007. More recently, DoCoMo has unveiled a prototype micro-polymer electrolyte fuel-cell solution that will fit the small form factor of a mobile phone.

Although fuel-cell batteries are unlikely to start making their way into handsets in 2006, the work to develop the next step from Lithium Ion (Li-Ion) batteries is significant. At present, vendors, chipset makers, and operators are focused on minimising power consumption to eke out the performance from Li-Ion technology, but in reality the task is like running up the 'down' escalator.

Battery life is the one major barrier to realising services such as mobile TV, which is likely to be among the most important service launches in 2006. The problem is that the screen on handsets remains the biggest draw on power –if you want to watch even a 30-minute program on a mobile device, it will eat up your battery because the display will be on.

Interestingly, though, KDDI's original research partner – Nokia – has decided to halt development of fuel cells until the technology becomes more mature. The decision probably has more to do with expense than any problem with the concept.

One development in 2005 that escaped a lot of attention was the growing number of handsets that complied with the Java Mobile 3D Graphics (M3G) API. It all sounds very complicated, but what that means is there are already a growing number of 3D-capable handsets in the market (see Figure 1). Handsets that comply with the standard offer a significantly improved gaming experience, so in 2006 we could see mobile phones that offer a competitive gaming experience when compared to standalone units such as the Sony PSP or the Nintendo DS.

Figure 1: Selected M3G-compliant handsets

Manufacturer	Model	Technology	Frequency (MHz)	Java software	Screen (pixels)	Available
Nokia	9500	GSM, GSM/GPRS	850, 900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 2.0, MMAPI 1.1, LAPI 1.0, WMA 1.1	640x200	No
Siemens	S65	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 2.0, MMAPI 1.1, LAPI 1.0, JABWT 1.0, WMA 1.1	132x176	Yes
	S66	GSM/GPRS	850, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 2.0, MMAPI 1.1, LAPI 1.0, JABWT 1.0, WMA 1.1	132x176	No
	S6C	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 2.0, MMAPI 1.1, LAPI 1.0, JABWT 1.0, WMA 1.1	132x176	Yes
	S6V	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 2.0, MMAPI 1.1, LAPI 1.0, JABWT 1.0, WMA 1.1	132x176	Yes
	SK65	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, LAPI 1.0, JABWT 1.0, CLDC 1.0, WMA 1.1	132x176	Yes
	SL65	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 2.0, MMAPI 1.1, LAPI 1.0, WMA 1.1	130x130	Yes
	SP65	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 2.0, MMAPI 1.1, LAPI 1.0, JABWT 1.0, WMA 1.1	132x176	No
Sony Ericsson	F500i	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	128x160	Yes
	K500c	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	128x160	No
	K500i	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	128x160	Yes
	K506c	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	128x160	No

Source: Sun Microsystems

Figure 1: Selected M3G-compliant handsets (continued)

Manufacturer	Model	Technology	Frequency (MHz)	Java software	Screen (pixels)	Available
	K508c	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	128x160	No
	K508i	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	128x160	No
	K700c	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	176x220	Yes
	K700i	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	176x220	Yes
	S700c	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	240x320	No
	S700i	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	240x320	No
	S710a	GSM/GPRS/ EDGE, PDC	800, 850, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	240x320	No
	Z500a	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	128x160	No
	Z500i	GSM/GPRS	900, 1800, 1900	JTWI 1.0, M3DAPI 1.0, CLDC 1.1, MIDP 1.0, MIDP 2.0, MMAPI 1.1, WMA 1.1	128x160	No

Source: Sun Microsystems

Q: What forthcoming handset features do you think consumers will welcome the most?

Michael Carroll: It seems clear that mobile music is already one of the most important features in the industry. Apple's iPod has clearly captured the public's imagination, with 10–11 million units sold since the device launched in 2003. Consumers are attracted to the device because it can store up to 4,000 tracks, looks good, and offers a very simple user interface via the front-mounted scroll wheel, which can take you from the top of the list of songs to the bottom in 10 seconds.

However, one of the comments I hear the most when people talk about their iPod is, "if you could just put a phone in there, I'd be happy". Handset vendors have listened, and today we

have two dedicated music phones in the market – Sony Ericsson's W800i 'Walkman' phone and Motorola's ROKR iTunes device, which was designed in conjunction with Apple.

At present these two phones only offer a 512MB memory card for storing music on – which equates to around 100 songs – so neither can truly be said to be a serious challenger to the iPod. Then again, the mobile phone must always be a compromise when compared to standalone devices that have only one function to perform, because a phone must remain a phone above everything else.

However, Sony Ericsson and Motorola have tapped into a potentially lucrative market – the W800i and ROKR are the forerunners in a range of music phones the duo plan to introduce in 2005 and 2006.

2006 should also see greater availability of DMB-H handsets that can handle broadcast-quality TV images. The service – in the different guise of DVB-H – has proven popular in markets such as South Korea and Japan, but it remains uncertain if users elsewhere will warm to the service. A lot is dependent on how well WCDMA handsets sell during the 2005 Christmas period. Trying to view digital TV broadcasts on a 2.5G network could prove disappointing for users.

While music and television on your mobile are high-profile examples of future applications, the biggest winner in 2006 is likely to be mobile e-mail. Providers of e-mail software have been working hard to offer push solutions – where the e-mail is automatically forwarded to the device in the same way as your desktop PC receives e-mail – and there are already a wide-range of handsets equipped to handle e-mails.

It seems that smartphones might be more popular with consumers, while PDAs could find a new lease of life among business users that want to read and reply to e-mails. The difference is down to the form factor, because a smartphone is probably only suitable for short replies rather than the full-length messages you would type on a regular keyboard. The PDA is simply the better device for writing on when it comes to long messages.

Q: Why integrate so many new features into mobile phones? Are vendors running scared?

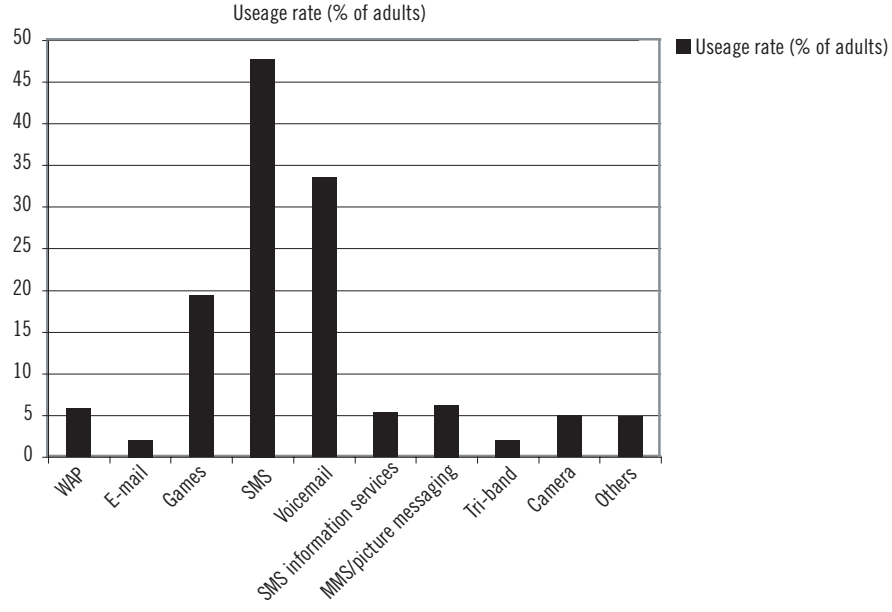
Michael Carroll: On the one hand the answer is obvious – more features are installed in mobile phones in order to sell more devices. The vendors will tell you that the mobile phone is the most trusted product consumers have, and also offers the greatest potential for integrating more features because it's rare that anyone who has a phone goes anywhere without it.

The 'trusted device' philosophy was certainly used to justify the inclusion of cameras in devices, and today you have an industry that has proven so popular that it has the regular camera-making industry running scared because mobile phones are rapidly catching up in terms of megapixel count with many standalone digital cameras.

Producers of camera modules for handsets are keeping the pressure on by introducing products that increase the pixel-count while keeping power drain to a minimum. We've already heard about 5-megapixel camera phone modules being produced, for example, suggesting even high-end digital cameras could soon be coming under threat.

The other view to take involves actual usage patterns. Research from BMRB International of UK users found that the most popular application after voice remains SMS, followed by voicemail and then gaming (see Figure 2.).

Figure 2: UK handset feature usage



Source: BMRB International

Given the usage figures and widespread predictions that handset sales growth will start to slow down around 2008, it is not unreasonable to assume that handset vendors are running scared and are looking for any technology to put in their products to protect their market share and sales.

The argument is that the very nature of a mobile phone means it cannot be as good at any application beyond voice compared to a standalone unit. If you want mobile gaming, the chances are you will have a much better experience on the Sony PSP or Nintendo DS than on any mobile handset, simply because those two devices are designed specifically for games. Incidentally, the PSP is also capable of viewing movies, so could eat into vendors' plans for mobile TV or video broadcasts.

As the handset industry is so often compared to the car industry, it seems fair to use a similar allegory. Any race car team will tell you there is simply no optimal set-up for any given circuit.

It is always a question of finding the best compromise. So, while a mobile phone might not always be the best at any given feature or application, it is fair to say it offers the best compromise. On what other device can you while away your time on a train listening to your own music, or playing a game, while also still being in touch through messaging or voice?

Installing more and more features in the handset is still a method of keeping sales momentum going, but at the same time it taps into consumers' desire for gadgets. In addition, the features installed don't necessarily have to be flashy, high-end solutions like the ability to view e-mail or watch TV programs. One of the least talked about and most welcome feature on many of today's devices is simply the inclusion of an FM radio.

So, no, handset vendors aren't running scared. Rather, they are looking to exploit technology developments and the prime real estate of being the only device consumers consistently carry to satisfy the need for increasing sales, and keeping operators happy.

Q: Apart from new features and technology, what else can vendors do to maintain their sales in saturated markets?

Michael Carroll: It is fair to say that technology sells, but only up to a point. Vendors have realised the need for handsets that are well designed in terms of the user interface and the shell of the device. Motorola and Sony Ericsson stand out as the firms that have employed a strong design philosophy to good effect.

However, the consumer market is fickle and there is no point having a device that looks good, but doesn't work well. So software has also become an important battleground. When you start meddling with software, however, you inevitably run into a mobile device's Achilles' heel – glitches.

A problem for one company often proves to be a benefit for another, and software problems in handsets have focused more attention on over-the-air upgrade and maintenance software solutions from the likes of InnoPath or Red Bend. One easy step vendors can take is to install OTA capability in their handset platforms, so any problems can be dealt with quickly and effectively.

Embedding software into the platform also opens the door for anti-virus firms, who say mobile devices are ripe for attack by mobile malware, Trojan horses, and worms – just like PCs. Any vendor that pays attention to the quality and safety of its software can quickly build a reputation for producing stable devices.

There is another aspect that vendors need to address. Increasingly, research is showing that consumers in developed markets can now see very little difference in devices from different vendors in terms of the functionality of the unit. The issue has prompted reports that say vendors need to pay more attention to their brand strategy and segmentation of handsets, because selling on functions alone is no longer effective.

Michael Carroll is an Editor

With seven years' industry experience, Michael is a handset and device expert. He is a regular speaker and moderator at industry events.

World Handset Forum Europe

The 5th World Handset Forum Europe will bring together operators and the handset industry's "value" web to identify strategic trends in the handset market and discuss the most successful strategies to increase operator revenues. Industry experts and practitioners will hold keynote addresses and lead interactive panel discussions in two streams to offer you coverage of the hottest topics in order to increase operators' revenues.

World Handset Forum Europe is part of the World Handset Forum Series: The definitive global networking events for the handset industry.

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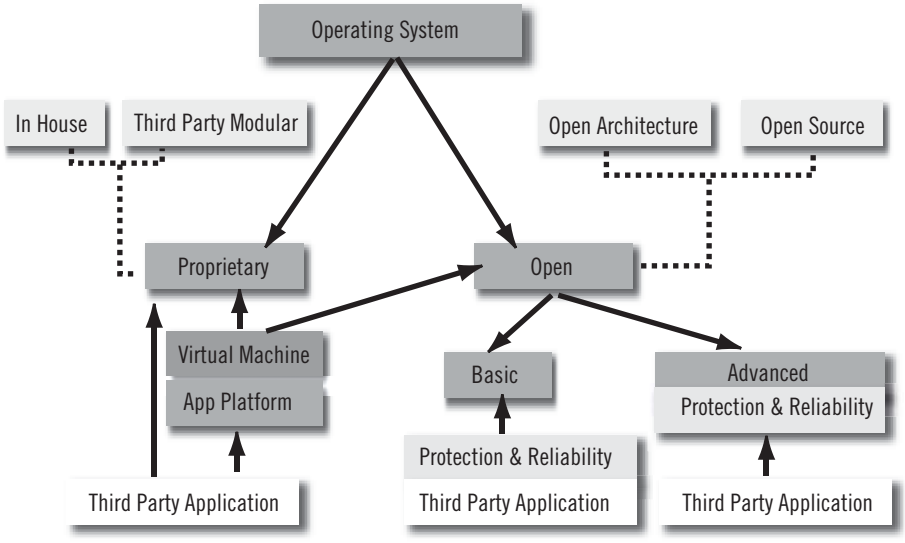
Mobile application platforms and operating systems

Sales of open OS handsets powered by Symbian will continue to fall over the next five years, reaching 39.5% of all open OS handset sales in 2010 (from 68.9% in 2004), says ***Malik Saadi****. Nevertheless, Symbian will remain the most widely-used open OS in the market by 2010, keeping Microsoft in second place.*

Q: What are the different types of application operating systems used today?

Malik Saadi: The possible scenarios for implementing an OS for data-enabled handset devices are highlighted below.

Figure 1: Mobile OS market segmentation



Source: Informa Telecoms and Media

Proprietary systems were the only choice for pioneering manufacturers of early data-enabled handset devices. These systems were partly built in-house, with some parts outsourced to consultancy houses and contractors. They have the advantage of highly compact code density designed to handle traditional applications and services into the limited capacity of a handset's memory.

However, with the increasing complexity of data-enabled devices, essentially related to the on-going number of advanced applications, features and services, device vendors are

progressively adopting a modular approach to building their own OSs from different third-party modules, application platforms and service clients. With this model, device vendors can customise their devices and quickly respond to operator requirements by incorporating the desired features and functionalities.

This eliminates dependence on third-party OS developers that generally update their product only every 12–18 months. In general, these OSs are extremely efficient for powering traditional and low-feature phones as they are specifically designed for the device on which they run and optimise the available resources.

However, this type of platform is not suitable for supporting feature-rich phones and smartphones because the complexity of designing these OSs increases with the number of features supported. This significantly increases development times and requires specialist developer knowledge, which dramatically affects both product time-to-market and cost.

In addition, the proprietary nature of these OSs makes it hard for service providers to support different devices with different OSs since this would necessitate significant resource and additional expense in adapting and managing services for each platform. The lack of interoperability between different OSs is another challenge facing service providers, preventing them from supplying common applications or services, as both applications and services are OS-client dependent.

Advanced OSs such as Symbian, Linux, Microsoft or Palm Source are necessary for the functionality of smartphones, handheld devices and feature-rich phones. These handsets are defined as advanced mobile terminals and combine several functions and computing capabilities including telephony, multimedia messaging services, video messaging and wireless network browsing.

These systems are commonly tagged as open platforms as they offer the developer community tools, resources and help through different development programs to encourage the creation of innovative, robust applications and services. However, so far these systems have proved to be relatively rigid, offering limited flexibility for device customisation.

Q: What are the challenges facing the mobile OS industry?

Malik Saadi: Hardware fragmentation is the main challenge that currently faces device vendors and OS developers. This factor complicates the development of standardised OSs. Unlike the PC market, new generations of mobile OSs have to cater for a range of handsets in the market. Lower end devices have relatively slow processors and limited memory, while high-end handsets require a higher performance OS to best use their hardware configuration.

Therefore it is not feasible to develop a single OS for all levels of handset. In addition, due to the different relative performances of different OSs for different market segments, vendors

face a further standardisation issue. Should they specify one OS platform across their portfolio or differentiate it in accordance to the device function and target market?

Another challenge facing the mobile industry is hardware–software integration. On average, advanced OSs are upgraded every 13 months. It currently takes, on average, an additional 18 months after the release of a new version of an OS, before devices powered by this version are seen in the market.

This is mainly due to the difficulties of hardware–software integration and interoperability tests. For example, the majority of Symbian devices and Palm devices are powered by versions released before 2003. NTT DoCoMo continues to use the very first version of Symbian V6.1.

Hardware requirements are another problem facing the upgrade cycles of advanced OSs. Although upgrading the OS to follow technology trends may be attractive for powering smartphones, this strategy may not be successful for addressing lower-tier segments.

Indeed, the latest version of an OS always requires more advanced hardware, which will in turn dramatically affect the bill of materials, consequently affecting the device cost.

Q: So how do most handset vendors address these problems?

Malik Saadi: Most handset vendors have adopted a strategy of embedding their proprietary OSs in low- to mid-range handsets with support from open applications platforms such as Java, BREW, i-mode, or Flash macromedia and incorporating advanced OSs for high-end handsets and smartphones. While greater OS functionality is a requirement of higher-end devices, these handsets are also sold at a higher price, which can better support the royalty payment required for each device.

Q: What market is expected for each advanced OS type in the coming years?

Malik Saadi: The main differences between handsets with advanced computing capabilities and connected handheld devices with cellular connectivity are form-factor and marketing. Handsets with advanced computing capabilities are low-end smartphones and currently include devices such as those powered by Nokia Series 60 and Microsoft Windows Mobile Smartphone Edition.

Devices powered by Microsoft Windows Mobile Pocket PC Edition, Palm Source, Nokia Series 80, or UIQ, are grouped under Informa Telecoms and Media's classification as high-end smartphones. In this classification, low-end smartphones can be defined as rich-media phones that embed a number of key features including MP3, camera, MMS, games, Java and e-mail.

While these devices may be used in the business and corporate markets, they are specifically targeted at the high-end and mid-range segments of the mass-consumer market. Although the gap between high-end and low-end smartphone functionality is closing, the former still

provides much higher performance than the latter. This is reflected in the price difference between the two categories.

Today, there is tough competition in the global smartphone market. Due to smartphones' advanced wireless data capabilities, mobile handset and handheld device vendors are trying to win share in what is forecast to be a lucrative market in the future.

Annual worldwide sales of smartphones almost doubled from about 14.6 million in 2003 to 26.5 million in 2004. This strong growth is forecast to continue to 49.9 million in 2005 and, by 2010, Informa Telecoms & Media predicts that 153.5 million new smartphones will be sold. While this is significant growth, in 2010 smartphones will still represent less than one in six devices sold – 17.4% – a 7% increase on 2005.

This share of total device sales will be limited because of reasons such as:

- the relatively high device price and cost of the wireless data network services
- the heavyweight design and large size of these devices in comparison with traditional handsets
- limited battery life caused by the powerful but power-hungry components (e.g. CPUs and high resolution screens) needed to deal with bandwidth-consuming data services.

In 2004, just over half – 52% – of smartphones sold were high-end smartphones. However, the overall growth in smartphone sales noted above will particularly benefit the more handset-like low-end smartphone segment, increasing its share from 54% in 2005 to 72% in 2010.

The success of smartphones will essentially rest on a smooth transition from 2.5G to 3G networks. Once 3G wireless technology is sufficiently mature and widely adopted, smartphones will become more attractive. This is because these devices support a large number of data services, such as e-commerce, multimedia messaging, music, video downloads, mobile entertainment and online games.

Q: Which will be the most widely used open OSs for smartphones in the future?

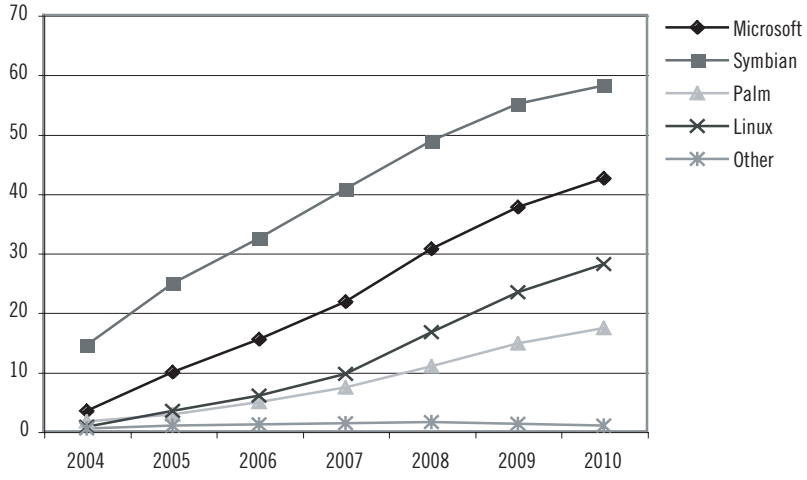
Malik Saadi: Open OSs are currently competing against proprietary OSs such as RIM's BlackBerry, although the latter are expected to be outstripped by 6:1 in terms of sales for 2005. Sales of devices powered by open OSs will grow from 42.3 million units in 2005 to reach 147.3 million units in 2010, compared with sales of 7.7 million falling to 6.2 million by 2010 for proprietary OSs.

Symbian is currently the worldwide leader in the open OS market for mobile phones, and is expected to hold a 59% share of the smartphone market in 2005 – a fall from 68.9% in 2004.

Symbian's share is anticipated to fall further over the next five years, reaching 39.5% by 2010, totalling 58.2 million smartphone sales.

The major contribution from sales of devices powered by Symbian is currently coming from Nokia, which contributes about 70% of total sales of Symbian devices. If Nokia's contribution was removed, Symbian would be classified as the third most popular open OS in the handset market. Symbian is mainly popular in Europe thanks to the strong popularity of Nokia's Series 60 in this region and in Japan due NTT DoCoMo's support of Symbian V6.1.

Figure 2: Worldwide open OS handset sales (m), by OS type, 2004–2010



Source: Informa Telecoms and Media

However, Symbian is much less popular in other regions of the world including Asia Pacific (excluding Japan) and North America. Symbian's current strategy is to partner with the leading OEMs such as Nokia, Motorola and Sony Ericsson. However, unlike Microsoft and PalmSource, Symbian has a very weak relationship with original device manufacturers (ODMs).

Winning over these players is considered to be the key to penetrating the feature phone segment. ODMs are increasingly partnering with operators and service providers, and not only are they very flexible in producing devices following operators' menus but, more importantly, unlike original equipment manufacturers (OEMs), they are less sensitive to branding issues.

Microsoft OSs currently hold second position in the open OS market with a share of about 16.6% for 2004, which is set to rise to 23% in 2005 and end the forecast period at 29%, having closed the gap on Symbian. Microsoft devices now also cut across both the low- and high-end smartphone range with the Smartphone Edition and Pocket PC Edition being the two categories of each respectively.

To consolidate its position in the mobile phone market, and in the smartphone market in particular, Microsoft's is building strong partnerships with service providers such as Orange, T-Mobile, Vodafone, Cingular, Verizon; OEMs such as Motorola, Samsung, or Palm Inc; and distributors such as i-mate or Q-Tek.

However, Microsoft aims to develop particularly strong relationships with ODMs such as HTC, MIO, or E-TEN, and is strongly involved in the reference design of mobile phones produced by ODM partners. Microsoft's decision to collaborate with ODMs is motivated by the control it can have over these players in order to build customised devices, according to the requirements of its partners among service providers and OEMs.

While Palm Source (now part of the Japanese firm Access) was the third-largest open OS in 2004, with 6% of sales, it is expected to be overtaken in 2005 by Linux. As a manufacturer coming from the PDA market, Palm OS smartphones have tended to stay in the high-end segment, with devices such as the popular Palm's Treo series, although there are now a number of low-end smartphones available.

Despite Palm OS's increase in market share to 11.8% by 2010, its over-reliance on the high-end market may hamper any significant growth in the future, assuming that the company is able to survive the tough competition in this market.

Dr Malik Kamal Saadi is a Senior Analyst

Malik has authored many flagship Informa Telecoms & Media reports, including *Future Mobile Computing*, and is a major contributor to research on mobile handset developments. Drawing on over ten years' experience in the space, Malik combines thorough understanding of strategic and business-related issues with an in-depth knowledge of telecommunications related technologies.

Mobile Application Platforms and Operating Systems Strategic Report

Mobile Application Platforms and Operating Systems - 2nd Edition is the definitive guide to the global market for mobile application platforms and operating systems. The report critically analyses technologies available, their future usage and revenue potential, major player's strategies and standardisation initiatives.

In addition, the report provides expert commentary on future industry outlook, ensuring you have the information needed to invest profitably in this expanding market- including detailed forecasts to 2010.

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Ultra low-cost handsets

Thanks to the development of the ultra low-cost segment, handset vendors have the opportunity to increase sales volumes to new consumers, says ***Gavin Byrne****. This will help offset the predicted slow down in handset sales in developed countries where mobile penetration is high.*

Q: Why are ultra low-cost handsets being developed today?

Gavin Byrne: Informa Telecoms & Media estimates that there will be 745.5 million new handsets sold to subscribers during the course of 2005. This is a significant increase on the 649.4 million sold in 2004, however, future annual growth rates will slow to a CAGR of 3.8% between 2005 and 2010.

A key reason for this reduced growth rate is the saturation of most markets in developed countries. Today, mobile subscription rates in Western Europe, North America and 'developed Asia Pacific' sit at 91.2%, 66.7% and 81.2% respectively (see Figure 1). Thus handset vendors are looking to markets outside these regions in order to bolster their sales.

Figure 1: Mobile subscription penetration rates forecast, end-2005

Region/country	Population (million)	Subscriptions (million)	Penetration rate (%)
North America	330.0	220.1	66.7
Latin America	558.5	222.6	39.8
Western Europe	473.1	431.5	91.2
Eastern Europe	411.3	242.6	59.0
Africa	900.9	119.8	13.3
Middle East	216.4	38.6	17.8
Developed Asia Pacific (Australia, Hong Kong, Japan, South Korea, New Zealand and Taiwan)	230.3	187.1	81.2
India	1,087.8	73.0	6.7
China	1,310.1	466.6	35.6
Rest of Asia Pacific	973.7	177.8	18.3
Total	**6,492.1**	**2,179.6**	**33.6**

Source: Informa Telecoms & Media

Device cost is seen as a major inhibitor of mobile communications adoption for most consumers in Latin America, Africa, India and China. But this is denying its benefits to some regions. At a macro-economic level, the March 2005 study Africa: The Impact of Mobile Phones demonstrated a causal link between the presence of mobile telecoms and economic development. The study, funded by Vodafone, found that the addition of 10 mobile handsets

per 100 of the population in a developing country between 1996 and 2003 would result in a GDP per capita growth of 0.59%, compared with a similar developing country without the additional 10 handsets per 100.

Any communications infrastructure must be reliable to encourage its use. Some developing countries, such as Afghanistan, have moved directly to the adoption of mobile telecoms technology, thereby skipping costly fixed-line deployment.

Individuals can contact emergency services far easier than before. With a dependable network in place, people no longer have to make long journeys to a different city or country to make a phone call.

This ensures that more revenue is generated in the country for the operator, helping further network investment, and increases tax perceived by the government. According to the Vodafone-funded study, small businesses in Africa have benefited from mobile telecoms, with their profits increasing despite increased call costs. In addition, the mobile telecoms industry is creating employment in developing countries thanks to the creation of call centres and greater requirement for experienced telecoms engineers.

Operators have tried to negotiate directly with handset vendors to supply devices at prices that would boost subscriber numbers. However, given the fragmentation of demand, vendors could not meet the operators' cost requirements. This key factor was overcome with the GSM Association's Emerging Market Handset (EMH) initiative.

Q: What is the Emerging Market Handset initiative?

Gavin Byrne: The EMH initiative is organised for operator members that serve emerging markets, defined as those based in any country below the average of the World Bank's GNP per capita index with a mobile penetration rate below 50%.

It aims to help "the unconnected" access mobile telecoms, thereby assisting the social and economic development of emerging market countries. Eligible operators can join the initiative, combining their handset volume and technical requirements into a single request for proposal (RFP) to supply a guaranteed minimum amount of handsets during a specified shipment.

The EMH member operators then award the tender to one vendor. It is understood that, at least for the first tender, EMH member operators had the right to the SIM-locked devices for an exclusive period of eight months. Thus operators not party to the initiative can order the same handsets once that time has elapsed.

The key benefit of the EMH is that the volume of handsets required is much increased thanks to the grouping of operator requirements. This larger total quantity makes the ultra low-cost handset (ULCH) segment a far more profitable proposition for handset vendors to address. But the development of ULCH is just one part of a three-pronged approach to help spread

the benefits of mobile telecoms. Regulation, taxation and service, identified by the GSMA as other costs that slow the spread of mobile telecoms, are also being addressed by the EMH initiative.

Q: What was the outcome of the first tender?

Gavin Byrne: Nine emerging markets operators (AIS Telecom, Bharti Televentures, Globe Telecom, Maxis Mobile, Orascom Telecom, SingTel Mobile, Smart Communications, Telenor Mobile and Turkcell) joined the EMH and issued the first tender to supply six million handsets at an ex-factory unit cost below US$40. Such was the interest in the process that 18 vendors entered into dialogue with the EMH and, after the list was reduced to six, Motorola was announced the winning vendor at the 3GSM World Congress in February 2005.

Motorola was chosen by the EMH as it scored highest overall on the following criteria: brand, form factor, function, logistics, marketing, price, service and usability. The American vendor started to supply the six million handsets from 2Q 2005 and had until end-2005 to complete its shipments. Under the tender, Motorola shipped two handsets both based on the vendor's C11x platform, which the vendor states is optimised "for durability, long talk time and [the] design preferences of emerging markets".

Despite the low margins involved, reliability needs to be high. In-service device failure causes vendor costs, lost revenue for the operator and a poor experience for the user. Thanks to its design the C115 is robust, has a very low fuel failure rate and an impressive standby time, crucial in regions with unreliable or non-existent power supply. Both dualband GSM handsets sport monochrome screens and SMS functionality.

Q: What has happened since the first EMH tender announcement in February 2005?

Gavin Byrne: In July 2005, with EMH initiative phase one handset shipments to India already showing signs of increased consumer interest, the GSMA announced the start of phase two. Ten operators (AIS Telecom, Bharti Televentures, BPL Mobile, Globe Telecom, Hutchison Essar Telecom, IDEA Cellular, MTN Group, Orascom Telecom, Telenor Mobile and Vodacom) signed up and agreed a RFP for six million handsets at an ex-factory price of under US$30, for shipment in the first half of 2006. This reduced price point is an important step in making mobile telecoms available to "the unconnected" and is driving technical developments such as single chipsets, to design out cost. It is also important to note that for phase two of the initiative, GSMA increased the maximum mobile penetration rate from 50% to 60%.

In late September, at 3GSM World Congress Asia, the GSMA revealed that Motorola had won the second tender process based on its score in the nine selection criteria used: brand, form factor, functionality, logistics capability, marketing support, price, service support, strategic commitment and usability.

The addition of the strategic commitment criterion may have played in the favour of Motorola, which, at the time of the first tender award, made clear its strategic intent to work with GSMA members to "develop follow-on products at sub-US$30 price points". This – coupled with Ed Zander's February 2005 statement that "connecting the unconnected with new ultra low-cost […] handsets is a critical component of Motorola's growth strategy" – shows the importance of the ULCH segment to handset vendors and may have helped the US vendor win the tender process for a second time. TCL & Alcatel mobile phones were highly commended for their low-cost proposal. This suggests that the decision for the second tender was perhaps closer than the first. Futhermore, there has been speculation since the phase two tender award that the final quantity may be for more than the minimum of six million units.

Again, handset vendor interest was high, with 10 vendors submitting concrete proposals, of which five were for devices with sub-US$30 ex-factory prices. This is an increase on the six concrete proposals made during phase one. Under this second tender process, Motorola submitted the C113 and C113a handsets. The C113a has been specifically designed for the EMH initiative and offers 330 hours, almost two weeks, standby time and 450 minutes talk time. Both monochrome screen, bar handsets are based on the same C11x platform that was successful in February 2005 and offer features including clock, calculator, alarm function and a ringtone composer.

Q: What other ULCH developments have occurred outside the EMH initiative?

Gavin Byrne: Although the CDMA Development Group (CDG) has been quieter on the issue of ULCH than the GSMA, it has not been sitting still. In March 2005, the CDG highlighted its own developing market handset project. The project, entitled Global Handset Requirements for CDMA (GHRC) project, has been in the market for about two years. The CDG feels it is unlikely that it will issue an RFP as the GSMA did. In addition it will not specify handset wholesale cost to the operators.

With the low number of features in ULCHs, the cost and number of components can be reduced, thereby lowering the handset bill of materials. One example is Infineon Technologies' announcement, in July 2005 of sample availability of its reference design for ULCHs. These single-chip GSM handsets offer SMS functionality but have less than 100 components and are housed in about one-third the area used currently. It is expected that there could be high volume production of handsets using this reference design by the end of 1Q 2006, at an ex-factory cost of approximately US$20.

Demand for telecoms in developing countries is not confined to urban areas. Although rural areas have a lower population density than urban centres, the development of services such as MTN's VillagePhone and Tuvugane shows there is a market. These programmes have enabled previously unconnected villages to benefit from access to the telecoms network. They

also allow entrepreneurs to develop a business and the network to generate more revenue from high traffic volumes.

Despite the demand for mobile communications, the success of the EMH initiative is not assured. Factors that will limit the adoption of new ULCHs include the recycling of handsets and grey- or black-market devices.

Given the number of new mobile handsets bought or received as upgrades annually, there are tens of millions of mobile phones that disappear out of circulation each year in the developed world. Many of these are disposed of into bins and landfill. If vendors, operators or third-party companies could attain a sufficient quality and volume of recycling, it may be economical to supply them to developing countries at relatively low cost, thereby reducing the demand for ULCHs.

Another way consumers in developing countries get higher specification handsets is via the grey or black market. Grey market, or parallel, imports take advantage of price differentials between countries. For mobile handsets this is particularly the case with subsidies or box splitting, although it is difficult to quantify. According to a recent GSMA taxation study, the black market accounts for almost 40% of handset sales today in emerging markets. While this is an area of real concern, it also shows the potential demand for new handsets in these markets.

Gavin Byrne is a Research Analyst

Gavin has over four years experience in research, competitive intelligence and benchmarking in areas such as fixed line Internet access, biometric authentication, storage products and warranties. He also counts several years marketing experience gained in the IT, Internet and consumer goods sectors.

Ultra Low Cost Handsets Event
6-7th December 2005, Brussels

2005 will see the first steps towards unlocking a new growth segment in mobile subscriptions- handsets below the $40 mark will come to emerging markets. Ultra Low Cost Handsets Event will be the perfect networking opportunity to discuss how this market can be developed into an astonishing growth segment.

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Appendix
Industry survey

Industry survey

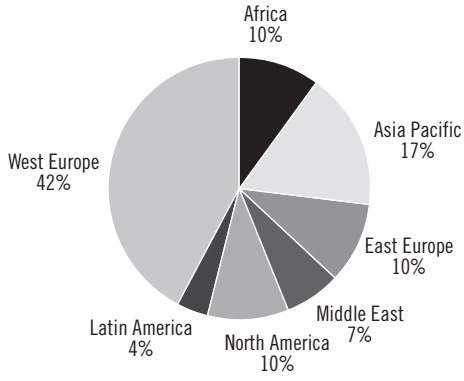
This Appendix gives the results of an Industry Survey conducted by Informa Telecoms & Media during October 2005. The online survey questionnaire was prepared by Informa Telecoms & Media analysts and the data was collected and analysed using Snap Professional™ statistical analysis software.

A total of 1,043 respondents completed the questionnaire. All respondents were asked to answer the same five questions and were then asked a further five questions that were dependent on whether they classified themselves as:

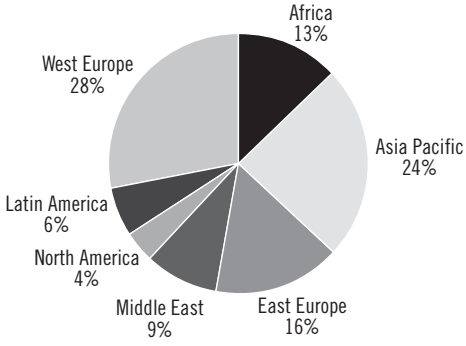
- Mobile operator
- Equipment vendor
- Handset vendor
- Other.

(Q1) What region are you based in?

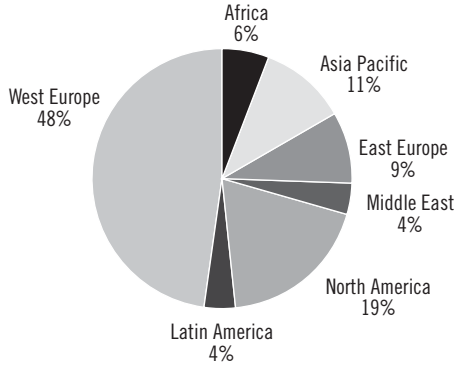
All respondents



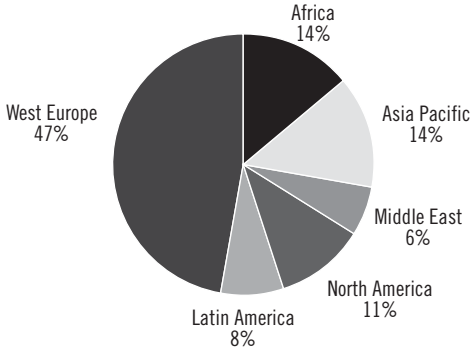
Mobile operators



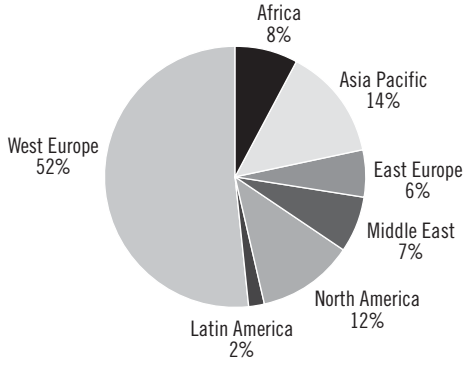
Equipment vendors



Handset vendors



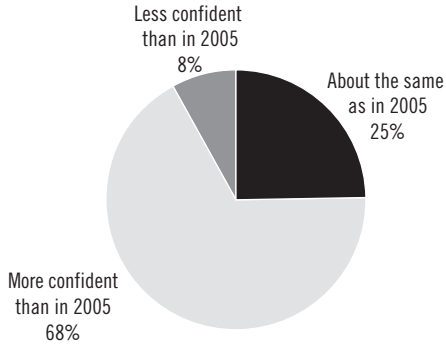
Other companies



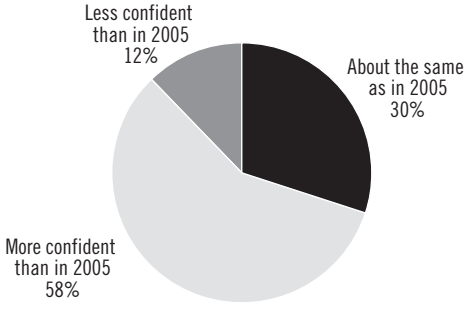
Source: Informa Telecoms & Media

(Q2) How confident are you about the prospects for you business in 2006?

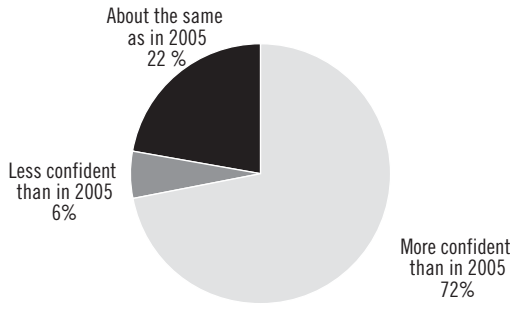
All respondents



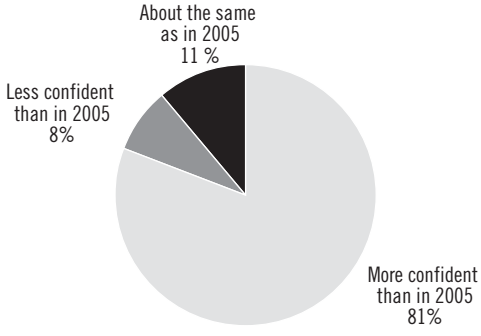
Mobile operators



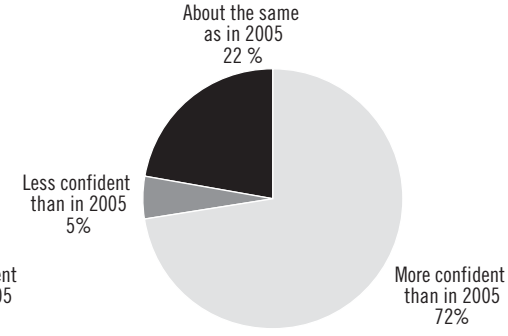
Equipment vendors



Handset vendors



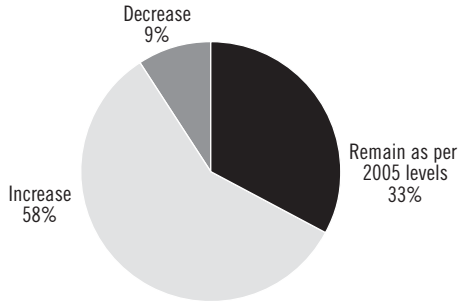
Other companies



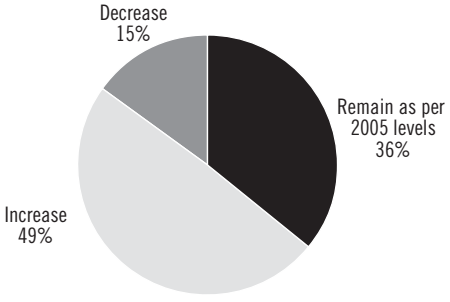
Source: Informa Telecoms & Media

(Q3) Do you expect mobile operators churn levels in 2006 to:-

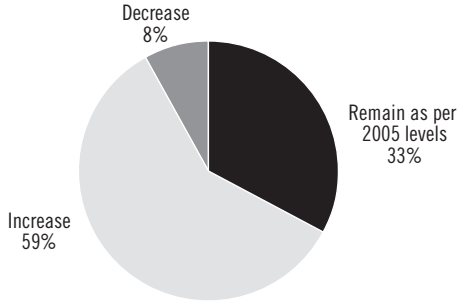
All respondents



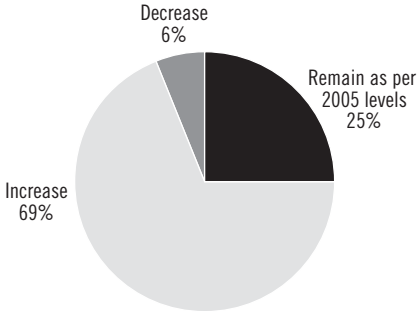
Mobile operators



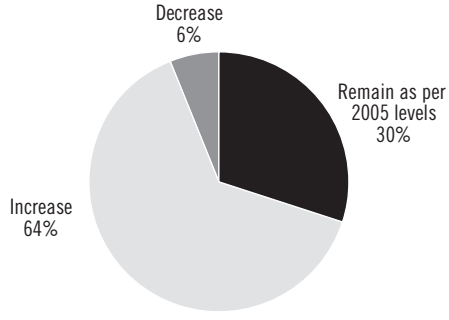
Equipment vendors



Handset vendors



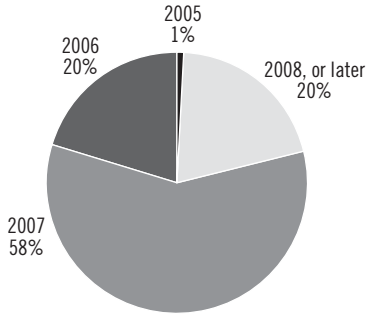
Other companies



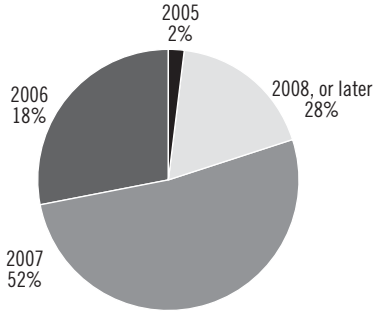
Source: Informa Telecoms & Media

(Q4) When do you expect to see rapid take-up of 3G services?

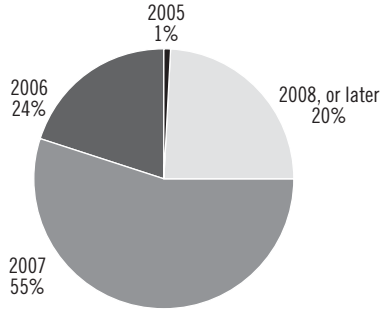
All respondents



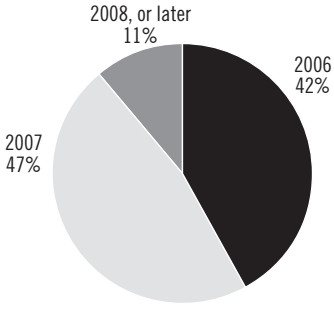
Mobile operators



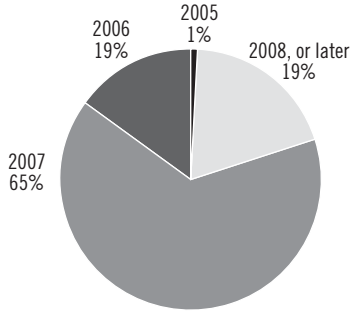
Equipment vendors



Handset vendors



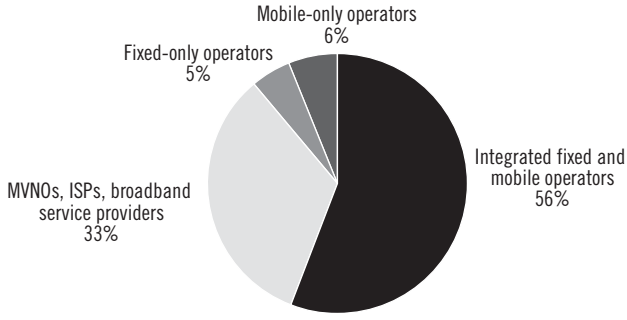
Other companies



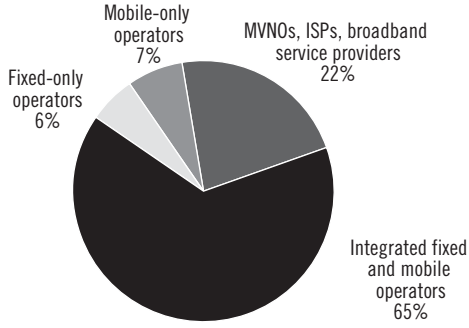
Source: Informa Telecoms & Media

(Q5) Who is best-placed to profit from convergence-IP-broadband?

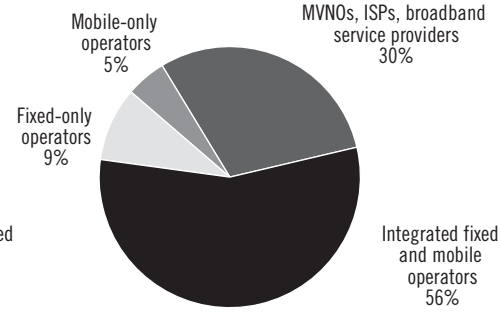
All respondents



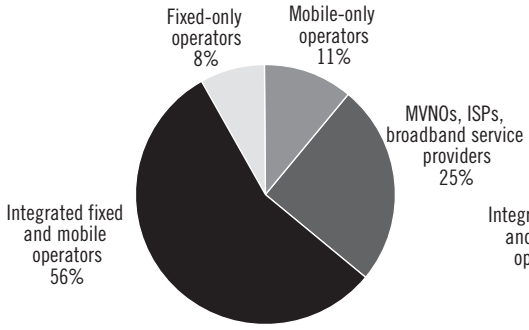
Mobile operators



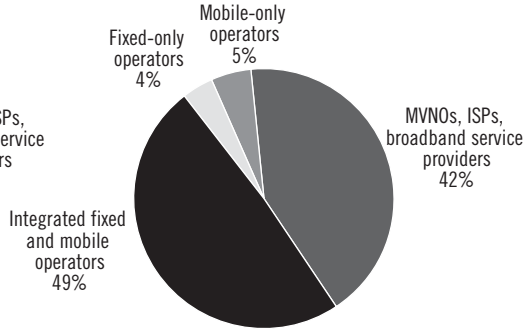
Equipment vendors



Handset vendors



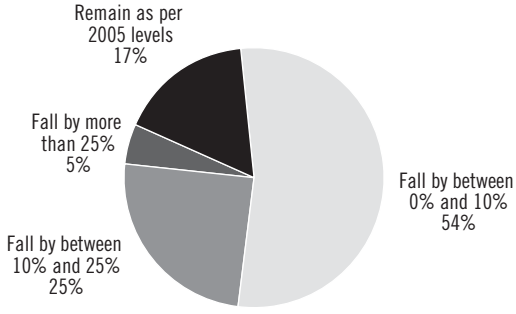
Other companies



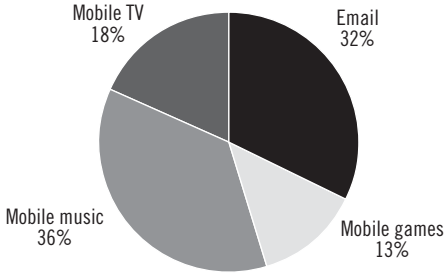
Source: Informa Telecoms & Media

Mobile operators only

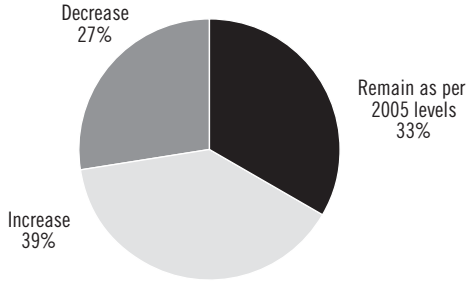
(Q6) Do you think the price of basic voice services in 2006 will:-



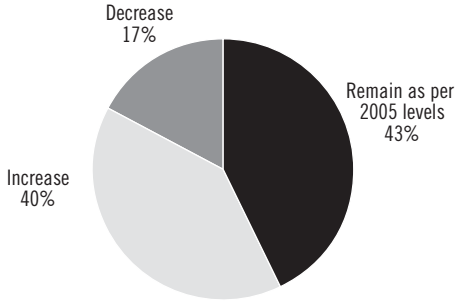
(Q7) Which of the following content services do you think will create most interest in 2006?



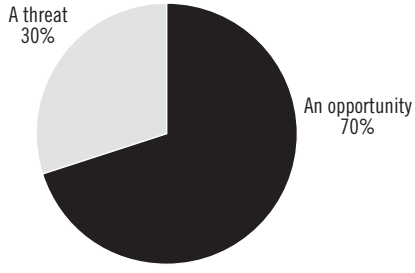
(Q8) Do you expect blended ARPU in 2006 to:-



(Q9) Do you expect handset subsidies in 2006 to:-



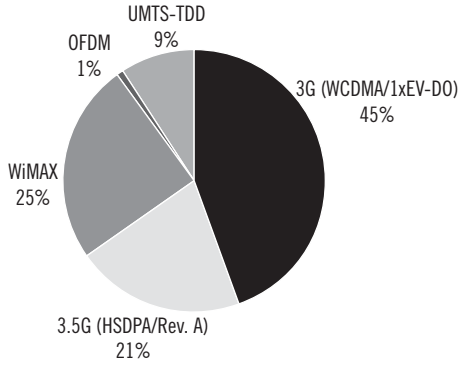
(Q10) Do you see wireless VoIP as:-



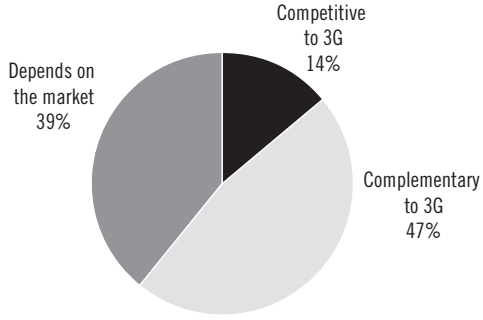
Source: Informa Telecoms & Media

Equipment vendors only

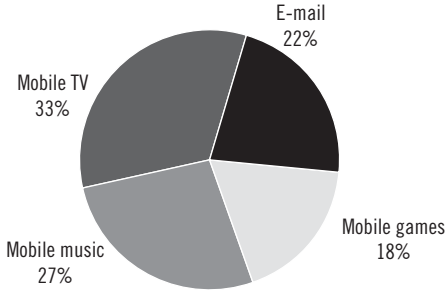
(Q6) Which technology do you think will have the greatest impact during 2006?



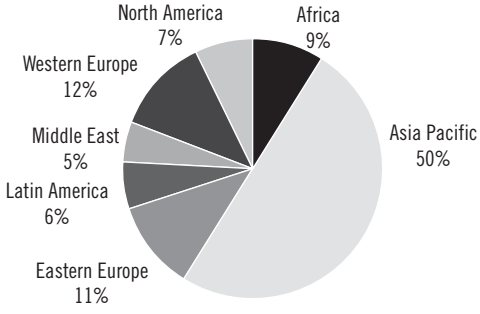
(Q7) Do you think WiMAX will be:



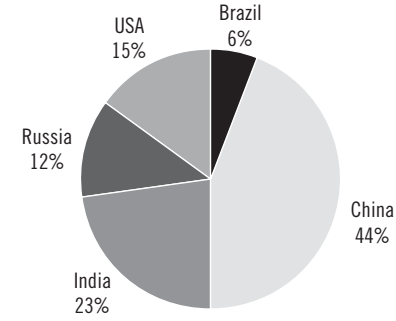
(Q8) Which of the following content services do you think will create most interest in 2006?



(Q9) Which regions do you think will see the fastest growth for your business in 2006?



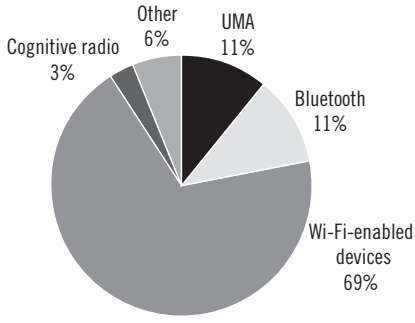
(Q10) Which countries do you think will see the fastest growth in 2006?



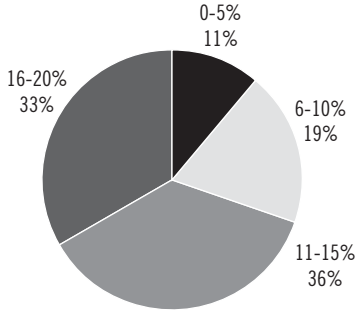
Source: Informa Telecoms & Media

Handset vendors only

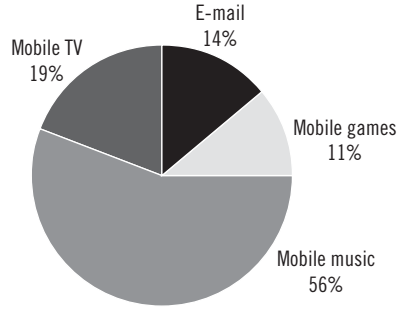
(Q6) Which of the following do you think will become most used to offer fixed-mobile services?



(Q7) What do you expect operating profit margins to be for your business in 2006?



(Q8) Which of the following content services do you think will create most interest in 2006?



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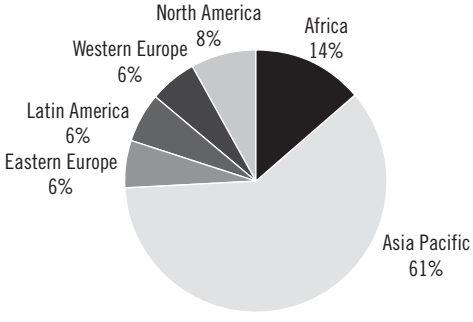

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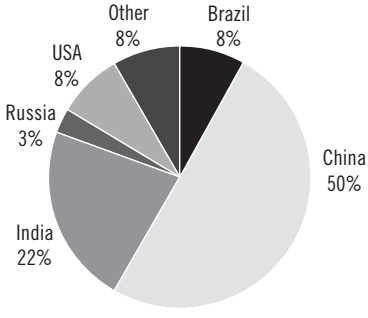
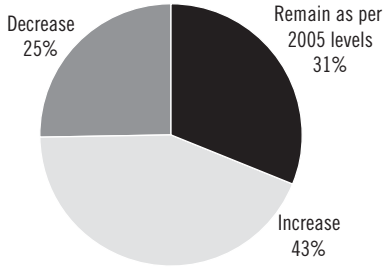


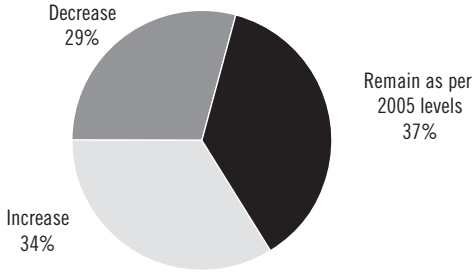
Source: Informa Telecoms & Media

Other companies only

(Q6) Do you expect blended ARPU in 2006 to:-



(Q7) Do you expect handset subsidies in 2006 to:-



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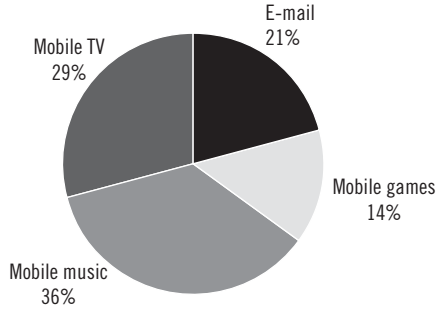

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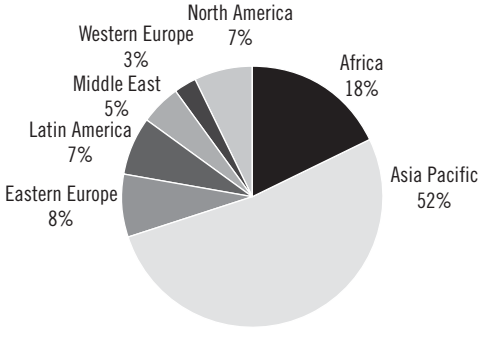

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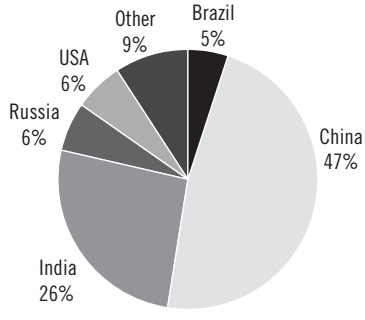

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