



UMTS Forum Report 39

**The Global Market for High Speed Packet Access (HSPA):
Quantitative and Qualitative analysis**



Context

This report has been produced by the UMTS Forum, an association of telecommunications operators, manufacturers and regulators. The UMTS Forum comprises of IT and media industries interested in broadband mobile multimedia that are active both in Europe and other parts of the world and who share the vision of UMTS (Universal Mobile Telecommunications System). In terms of a technology platform, UMTS is moving mobile communications forward, providing third generation mobile services that deliver speech, data, pictures, graphics, video communication and other wide-band information direct to people on the move. UMTS UTRA (Universal Terrestrial Radio Access) is a member of the IMT-2000 family of standards.

This report constitutes a deliverable of one of the major items the UMTS Forum's work programme. The promotion of and the facilitation of High Speed Packet Access (HSPA) introduction is one of the key focuses of the Forum at present.

Report 39 is one of the family members of UMTS Forum reports that deal with UTRAN enhancements. Other outputs from the Forum cover technical aspects, economic conditions, and licensing issues.

To provide an independent view of the market potential of HSPA, the UMTS Forum commissioned Analysys Research to provide the market forecasts in this report. The UMTS Forum accepts the market forecasts as a reasonable view of the future impact of HSPA.

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Executive Summary

The UMTS Forum, in association with Analysys Research, forecasts that High Speed Packet Access (HSPA) will become the world's leading 3G Mobile technology and will have almost one billion active users by 2012.

This report quantifies how the improvements offered by HSPA technology will stimulate the market for 3G data services. HSPA offers improvements in communications from both the end-user to the networks (often referred to as High Speed Downlink Packet Access) as well as from the network to the end-user (often referred to as High Speed Uplink Packet Access). In particular HSPA will offer;

- Improved speed of access up to 14.4Mbps to the terminal,
- Improved interactivity through minimised packet delays,
- And improved network capacity to support more 3G users.

The report looks at how HSPA will improve the operators' ability to deliver advanced applications such as;

- Mobile TV and video services,
- Music Downloads,
- Advanced Business Applications.

As well as quantifying the demand for these applications, the report also estimates how HSPA will modify the user behaviour.

Based on the research and modelling carried out for the report, the UMTS Forum anticipates that HSPA will generate €56bn in supplementary revenue for mobile operators through stimulating data ARPUs by 2012



Overall the report forecasts that 3G mobile data revenues will increase from €17bn in 2006 to over €120bn in 2012.

The report highlights a number of the key drivers for operators to upgrade existing 3G networks to HSPA or to build greenfield HSPA networks. These include;

- Support for a broad range of services,
- Immediate availability of spectrum in the majority of markets,
- A low risk upgrade path from UMTS today to HSDPA and then to HSUPA,
- A significantly lower cost per bit when compared with other 3GPP technologies.



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1 HSPA upgrades are available to operators seeking to increase ARPUs or drive penetration

With high levels of mobile penetration in many developed countries, the potential for revenue growth through adding new subscribers is becoming more limited. Consequently, maintaining or growing average revenue per user (ARPU) is now seen as the key driver of revenue growth for operators in the most well-established markets. Encouraging customers to take up mobile data services or to make more of their voice calls using a mobile rather than a fixed phone are the two main ways of achieving this and new cellular technologies, such as High Speed Packet Access (HSPA), are being rolled out to help operators achieve this goal by offering increasing network capacity, lower costs per Mbyte and higher bandwidth.

1.1 Investment in HSPA is now an option mobile operators are considering to drive subscriber and ARPU growth

At the end of 2005 the total number of mobile subscribers had reached two billion worldwide. Of these some 85 million took 3G services with over 90% of these in the Developed Asia and Western Europe regions. While in Western Europe mobile penetration rates exceeded 100%, those in Eastern Europe, North America and Developed Asia were lower (67%, 62% and 80% respectively) with the Rest of Asia and Rest of World regions having even lower penetration rates of 18% and 28% respectively. The impending, or already existing, saturation of many country markets leaves operators unable to rely solely on adding new subscribers to maintain revenue growth.

Figure 1.1 shows the total non-3G and 3G subscriber base and population penetration rates for each region at the end of 2005.

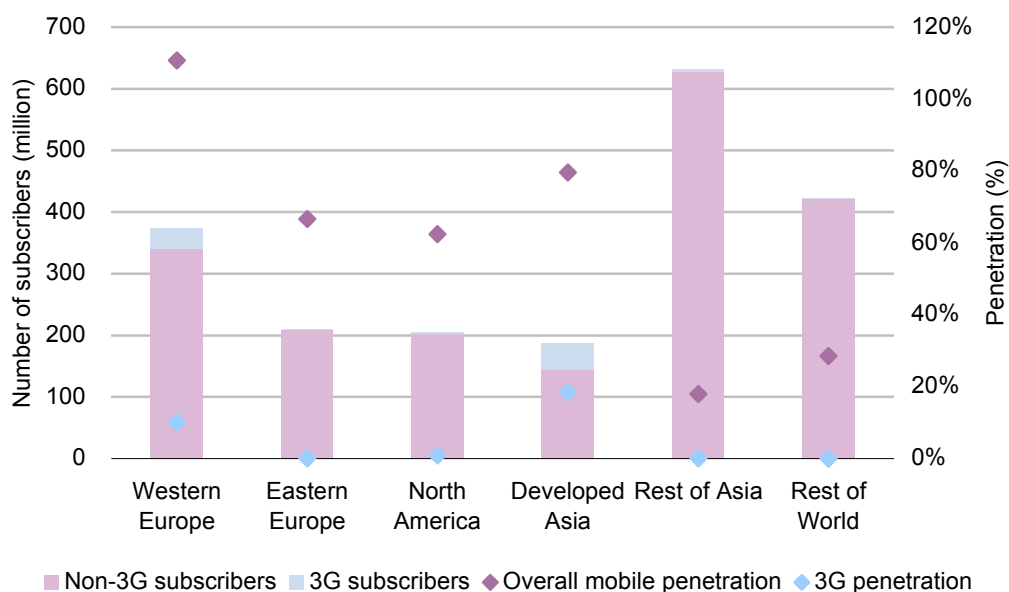


Figure 1-1 Total non-3G and 3G subscribers and penetration rates by region, end 2005

1.1.1 Growing the take up and use of mobile data services is one option available to mobile operators seeking to increase ARPU

Although the focus of this report is on mobile data applications it is important to recall that for all mobile operators today, voice remains the core revenue generator accounting for 75–95% of revenues across different regions. With a relatively high revenue per Mbyte (in comparison with, say, mobile broadband or even moderate levels of usage of mobile TV), opportunities to grow ARPU through increased mobile voice usage (e.g. via fixed-mobile substitution) should not be overlooked.

Figure 1.2 shows the percentage of revenues derived from voice services in each region in 2005.

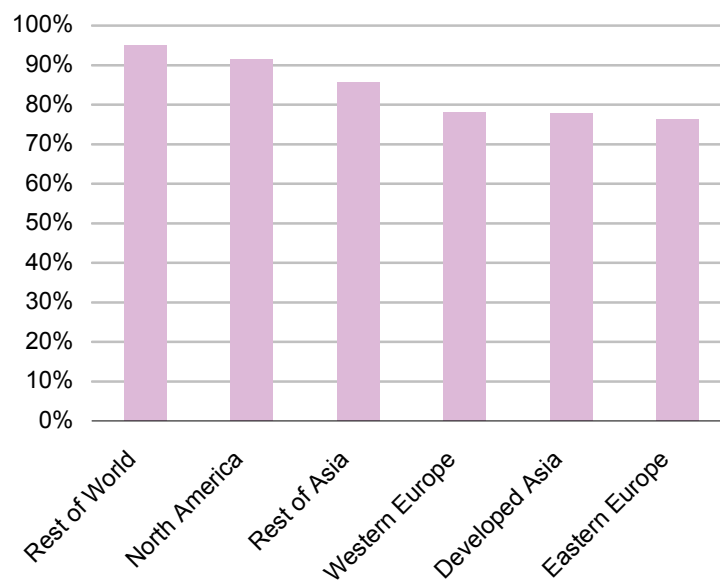


Figure 1-2 Voice Revenues as a percentage of total revenues

However increasing user adoption and usage of mobile data services is a key strategy for mobile operators seeking to grow subscriber ARPU.

SMS currently remains the principle generator of non-voice revenues. However a wide range of other data services are now available to mobile subscribers including browsing, data networking and entertainment services (e.g. downloadable games and music tracks, mobile TV and video clips and personalisation services such as ringtone downloads).



1.1.2 Increased usage of data services implies a requirement for greater network bandwidth and capacity as well as a lower cost per Mbyte

In order to support data services such as mobile-TV and video and high-speed Internet access, which could consume substantial network traffic, operators will need to develop their networks beyond basic 3G.

Providing a satisfactory user experience for many mobile data services will require higher levels of bandwidth than may be provided over basic 3G networks. Furthermore, although an SMS consumes relatively little network resource (0.00015Mbyte per SMS), other small-screen data services will require substantial capacity. For example, a three-minute mobile video clip may consume 3Mbyte. If such services become popular they could generate substantial network traffic implying a necessity to substantially grow network capacity.

Figure 1.3 provides an illustrative forecast of the growth in service traffic from voice, small-screen data and Internet/Intranet access services for a typical mobile user in a developed market.

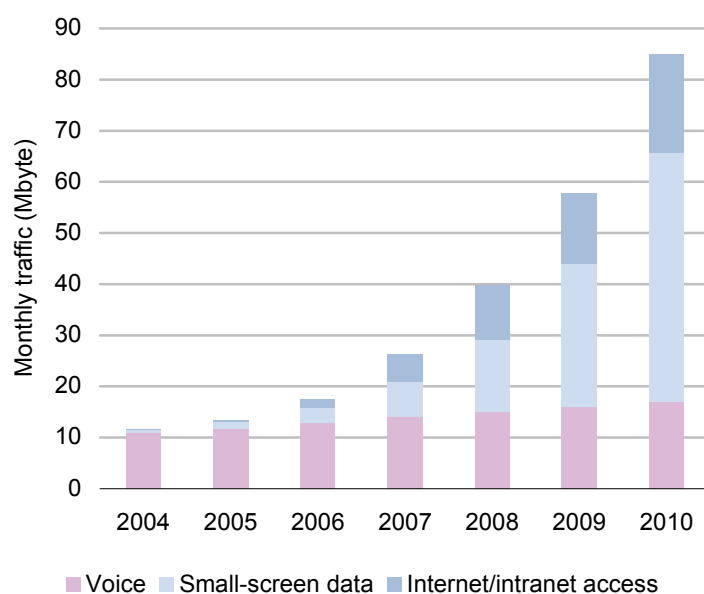


Figure 1-3 Illustrative forecast growth in service traffic for a typical mobile user in a developed market

1.1.3 HSPA will enable UMTS operators to upgrade their networks to provide the necessary bandwidth and capacity to support some (though not all) data services¹

HSDPA is an important development for the UMTS standard, which significantly improves the performance of the downlink (from the network to mobile devices). In a typical wide-

¹ Enhancements to the CDMA2000 family (e.g. CDMA2000 1x EV-DO) and BWA technologies including standards such as IEEE 802.16 (WiMax) and proprietary systems from vendors including Flarion and IPWireless which promise comparable improvements are considered in chapter 4.



area deployment it is likely to triple the average data rate experienced by individual users (to over 1Mbit/s), double the available capacity, halve the access cost per Mbyte and halve the downlink delay. Significantly, it does this within the context of existing UMTS specifications, infrastructure and services. Hence, HSDPA can be deployed by upgrading existing equipment and it operates within existing spectrum allocations. Beyond HSDPA, HSUPA will achieve speed, capacity and delay improvements to the UMTS uplink from 2007.

This report provides an overview of the qualitative and quantitative impact that HSPA could have in terms of the services that mobile subscribers will take over the period 2006–2012. Chapter 2 describes the services that HSPA will enable and assesses their volume impact. Chapter 3 provides forecasts for the levels of adoption of HSPA services, trends in ARPU and HSPA service revenues.

2 HSPA upgrades will enable operators to offer customers more advanced applications

By offering reduced latency, higher bandwidth and greater capacity, HSPA will enable both consumers and business customers to benefit from richer content and an improved user experience. Reduced cost per Mbyte makes it possible to make services more affordable whilst still maintaining sufficient profit margins.

2.1 HSPA will enable greater adoption of mobile TV and video services, music downloads and access to business applications

Mobile TV and video services, music downloads and business Intranet access provide illustrations of how higher bandwidth and capacity HSPA networks will drive increased adoption and usage of mobile data services.

2.1.1 HSPA will further enable operators to provide video clips and TV-like experience – though should be supplemented by MBMS for full mobile TV

Since 2004, there has been rapid development in mobile TV and video services, as operators have started to see the potential of such services to drive 3G take-up and ARPU. While Japan and South Korea were the first markets in which 3G services were launched, South Korea experienced substantially higher initial take-up. This was due largely to a sharp focus on new TV and video services, backed by strong marketing and aggressive pricing to make the services relatively affordable. By July 2005, SK Telecom's 'June' service, offering streamed TV channels



and video on demand, had 5.1 million customers. In France, Orange launched a 3G mobile TV service in November 2004. Orange claimed that the first 35 000 subscribers on its 3G network watched an average of 25 minutes of live TV on their mobile phones in its first two months of the service's operation. According to Orange, more than half of its addressable 3G customer base uses video services on a regular basis and expects live TV to become a successful mass-market service. In July 2005, Orange reported that 500 000 video downloads were being made per week.

A wide variety of mobile TV and video services is now on offer. Services range from limited video clips, to streaming of conventional TV channels, to special made-for-mobile content.

However compared to many other mobile services, TV and video services can consume substantial bandwidth, even with relatively low usage levels, as shown in Figure 2.1.

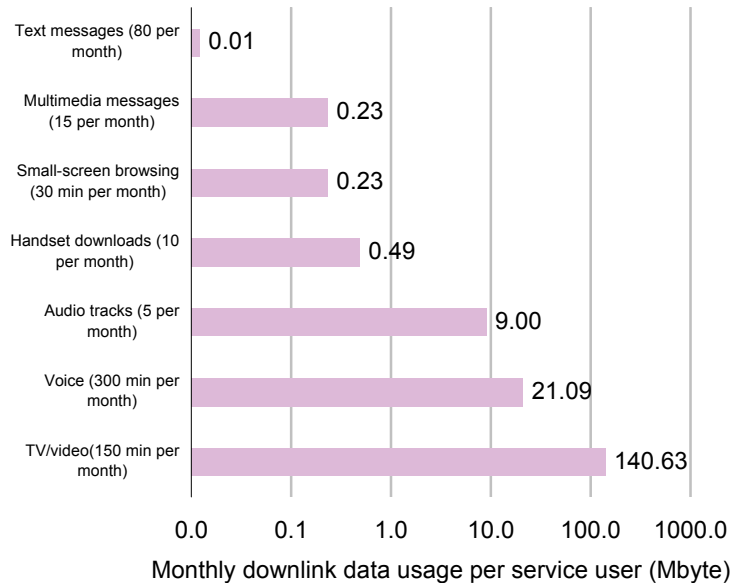


Figure 2-1 Comparison of downlink data consumption of TV and Video services with voice telephony and other mobile data services

For example, just five minutes per day of TV and video viewing (less than 3% of typical conventional TV viewing) streamed at 128kbit/s would consume the same downlink network traffic as 2000 minutes of voice telephony per month. This poses a particular set of challenges.

Mobile TV offers operators the opportunity to fill underutilised 3G networks and could be a key driver for the increased capacity offered by HSPA. However as adoption and usage levels increase it is likely that HSPA networks will need to be supplemented by MBMS to provide efficient use of capacity. Supplemental broadcast technologies including DMB, DVB-H, MediaFLO and others may also need to be considered in order to avoid filling 3G networks with low revenue per Mbyte traffic.

Figure 2.2 illustrates the capacity limitations of UMTS and HSDPA networks. The figure shows the network traffic generated by different levels of mobile TV service take-up and average daily usage, comparing this with the estimated capacity of a typical 3G or HSDPA network with approximately 10 000 base stations.

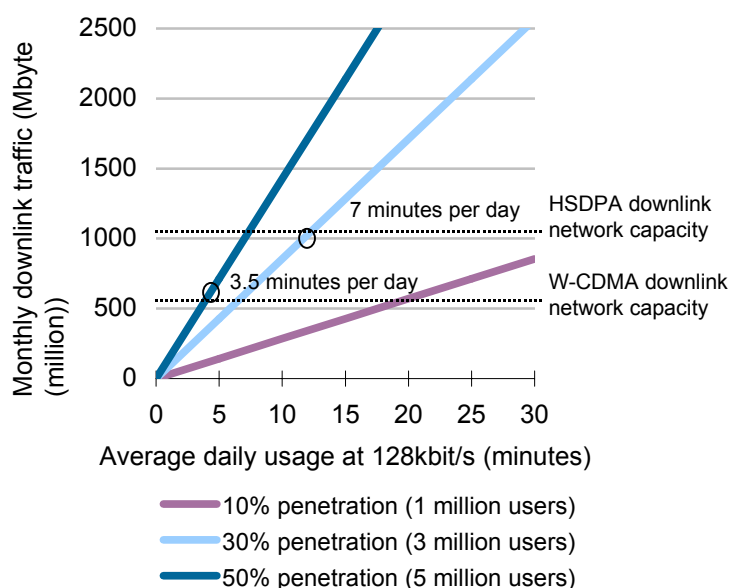


Figure 2-2 Example capacities of national UMTS & HSDPA networks, and how these relate to mobile TV take-up and usage levels

In the example shown in Figure 2.2, the entire UMTS network capacity would be filled if 5 million people (50% of the total customer base) used the TV and video services for an average of just 3.5 minutes per day. HSDPA could double this limit, but only if HSDPA handsets supporting mobile TV services become ubiquitous.

2.1.2 Mobile music downloads are likely to grow as higher bandwidth networks and lower cost per Mbyte enable more affordable pricing and improved customer experience

In contrast to games downloads, which have seen rapid adoption in many markets, music downloads have yet to exhibit substantial take-up by consumers. A principle barrier to take-up has been the price premium of such services in comparison with equivalent fixed network music download services. Mobile music downloads can typically cost two to three times as much (EUR3–4 per download) as fixed music download services such as iTunes.

The lower cost per Mbyte that will be enabled by HSDPA will allow mobile operators to lower the price of music downloads. This will reduce the ‘mobility premium’ for music downloads and is likely to stimulate usage.

In addition to improving the cost-effectiveness of mobile download services it will be necessary for operators to address a number of other issues. For example:

- **simplifying pricing structures** – currently subscribers can incur traffic charges for locating the music download on an operator’s portal, then the cost of the music download and then a further traffic cost for downloading the track. This complexity of charges acts as a disincentive to user adoption
- **handset capacity** – hard drive based mp3 players from vendors such as Apple, Creative, Philips and Sony typically have massively greater storage capacity than that available on mobile phones. While users are unlikely to require 20–30Gbytes of storage capacity on their phones, providing the ability to store several Gbytes of storage capacity will improve users willingness to download music onto their mobile phones
- **battery life** – ensuring that more advanced devices have a decent length of battery life to support the higher rates of connectivity and audio and visual requirements being placed on them will be critical to driving up average usage of services



- **simplification of user interface** – while the increased speed of 3G and HSDPA will improve the user experience it will still be essential to minimise the number of menus that must be navigated in order to locate the desired download for example through customised handsets with a ‘music download’ button

2.1.3 For the business market higher bandwidth will encourage greater use of file-transfer, VPN access, and a range of enterprise applications

While mobile email based solutions such as RIM’s Blackberry service have seen considerable success over the past two to three years there remain a number of barriers to employees making greater use of mobile connectivity to access business applications. Principle among these are:

- lack of speedy and reliable mobile networks
- compelling combinations of applications, devices, implementation options and pricing

The mobile data service requirements of businesses vary widely. Exhibit 2.3 provides an overview of the five main types of business mobile data service according to breadth of service market and the degree of customisation required.

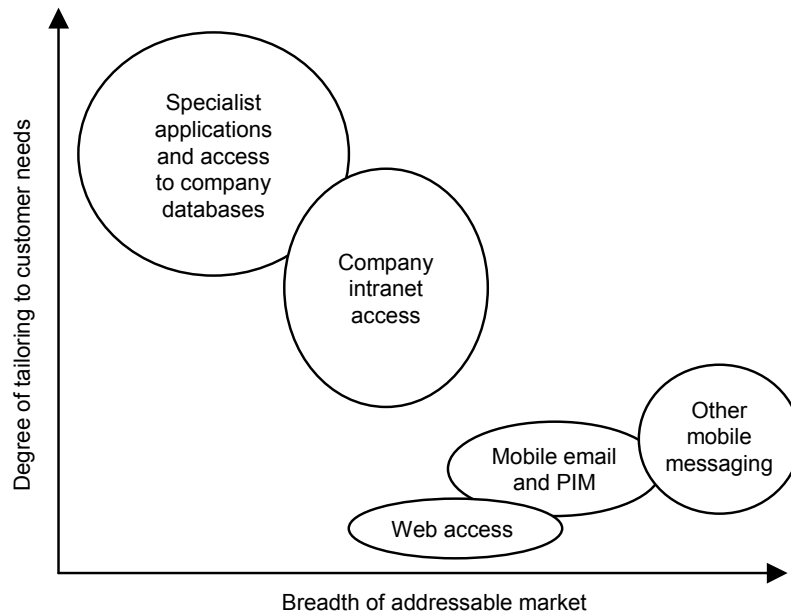


Figure 2-3 Categories of mobile data services for businesses, by degree of tailoring to customers' needs and breadth of addressable market

Mobile Web access is a standard service for GPRS business customers. However, service usage is limited by the slow speed and high cost of cellular networks compared with fixed broadband connections, and by the user interfaces of mobile devices. Nevertheless, mobile Web access could be an important revenue generator for mobile operators as a by-product of business customers with PDAs and laptops purchasing mobile connectivity for other solutions, such as email or intranet access

Mobile access to company intranets is more compelling than mobile Web access because, instead of providing access to a large quantity of general information, intranet access provides access to the information that is likely to be most relevant to mobile workers – their own company data and files. However as file size increases, network bandwidth becomes increasingly important – here



HSDPA and HSUPA will be a key enabler of mobile Intranet access and associated file transfer for road warriors.

2.2 Data services will exhibit different usage patterns depending on the mix of messaging, browsing, streaming and downloading behaviour

Take-up and usage of data services will vary between regions as operators promote different combinations of services based on specific cultural and technological contexts. Increased usage of HSPA-enabled services will occur due to falling tariffs, improved user experience and greater awareness of services.

2.2.1 In forecasting usage of data services this report has adopted the categorisation previously developed by the UMTS Forum

In modelling the usage and revenues from data services, this report uses a categorisation previously developed by the UMTS Forum. This groups the different services for which customers into five service categories:

- Location based services
- Mobile Internet
- MMS
- Mobile intranet/extranet
- Customised infotainment

Definitions for each service category are shown in Figure 2.4.

<i>Service Category</i>	<i>Description</i>
Location based services	A service that enables users to find other people, vehicles, resources, services or machines. It also enables others to find users as well as enabling users to identify their own location via terminal or vehicle identification. Revenue could be derived from a wide range of potential applications including tracking/personal safety, location based m-commerce, restaurant guides, local business directories, weather information, advertising and location-based m-commerce.
Mobile Internet	A service that offers mobile access to full fixed ISP services with near-wireline transmission quality and functionality. It includes full Web access to the Internet as well as file transfer, email, and streaming video/audio capability. Mobile internet revenues are revenues derived from providing access to the internet. A wide range of applications may drive mobile internet traffic ranging from entertainment services such as online and downloadable games to video streaming, VoIP and sending or receiving emails.
MMS ²	A service that offers non-real-time multimedia messaging with always-on capabilities allowing the provision of instant messaging. Targeted at closed user groups that can be services provider- or user-defined. MMS revenues include revenues Unified Messaging, Enhanced Messaging, Picture/video messaging, Mobile Instant Messaging. Messages derived from 3 rd party content will drive use.
Mobile intranet/extranet	A business service that provides secure mobile access to corporate LANs, VPNs and the Internet. Mobile intranet/extranet revenues are revenues derived from access by business users to the internet and extranet.
Customised infotainment	A consumer service that provides device independent access to personalised content anywhere, anytime via structure-access mechanisms based on mobile portals. Customised infotainment revenues includes revenues from m-commerce activities, entertainment services, information services and advertising.

Figure 2-4 Description of UMTS Forum Service Categories

² In previous UMTS Forum reports the MMS category has included SMS. In this report SMS is excluded from this category.



Forecasting usage per subscriber implies understanding the drivers for different types of traffic consumption

In forecasting usage per subscriber for each service category, we have considered the four types of traffic that could be generated in delivering each service. These traffic types are:

- messaging
- browsing
- streaming
- downloading.

For example, a subscriber using a customised infotainment service may in a given period have content delivered to them through a mix of:

- time spent browsing on the operator's portal
- news or sports updates delivered by SMS
- TV clips streamed on demand
- games or ringtones downloaded.

The effect of HSPA on 3G-user behaviour has been modelled through assessing how much additional traffic might be generated by a subscriber using a HSPA-enabled handset for each service category.

The reasons for a HSPA subscriber consuming more traffic than a basic 3G subscriber include:

- **cheaper services** due to operators having a lower cost per Mbyte with well-utilised HSPA network
- **better user experience** due to higher bandwidth and lower latency



- **availability of richer content** for example with operators striking content-partnership deals with content rights owners to deliver a range of mobile TV channels and video clips
- **increased awareness of services** leading to higher usage rates as a result of marketing and through word of mouth recommendation

Over time the average usage per subscriber is expected to increase due to a number of factors including:

- reductions in the price of services
- marketing and promotion campaigns taking effect
- ease of using services increasing
- word of mouth recommendation broadening user awareness of services
- wider availability of content
- improved network coverage and quality of service
- habit formation.

2.2.2 The average usage of an HSPA subscriber will be substantially higher than a basic 3G subscriber by 2012

The extent of the increase in average usage of HSPA services over non-HSPA services will vary by type of service and by region as cultural differences interact with service availability and adoption rates. Across all regions and services, however, the increased performance of HSPA services will lead to higher average usage rates.

The average levels of usage within the HSPA and non-HSPA subscriber bases, when calculated across all customers, hides substantial variations both in the adoption levels for individual services and in the levels of usage which individual subscribers will make of each service. As is currently the case with SMS, only a subset of HSPA subscribers will use any given data service (e.g. watching mobile TV, surfing the Internet or browsing a portal) and some users will have an



HSPA-enabled handset but will only use it for voice. Of those subscribers making use of data services, some will have much higher usage patterns (e.g. watching TV for 20–30 minutes daily) while others will be much less frequent users (e.g. watching only the occasional TV clip during any given month). Consequently, when the total levels of usage by customers who have adopted data services is divided across the entire HSPA customer base, the average usage per customer is reduced considerably. All average usage numbers cited in this report are calculated this way across the whole subscriber base.

Residential HSPA subscribers to Customised infotainment services will have average traffic per subscriber of 8-to-9 times that of non-HSPA subscribers by 2012

Residential Customised Infotainment services will include many of those services (such as mobile TV) that will generate the most heavy traffic across 3G networks (both HSPA and non-HSPA). By 2012 average HSPA subscriber usage of these services will have substantially grown to generate average traffic per subscriber of:

- 400Mbytes per year in 2012 compared with just over 100 Mbytes per year in 2006 in Developed Asia
- just under 280Mbytes per year in 2012 compared with just under 80Mbytes per year in 2006 in Western Europe
- just under 240Mbytes per year in 2012 compared in just over 60Mbytes per year in 2006 in North America.

Similar changes are forecast in the other regions where the absolute level of usage per subscriber are substantially lower.

Due to capacity and performance constraints, non-HSPA average subscriber usage of Customised Infotainment services will have grown much less strongly. By 2012, on average an HSPA

subscriber will be generating 8-to-9 times the average volume of traffic of a non-HSPA 3G subscriber from Customised Infotainment services.

Figure 2.5 shows the forecast average traffic per 3G subscriber (split non-HSPA/ HSPA) in 2006 and 2012 for residential Customised Infotainment services.

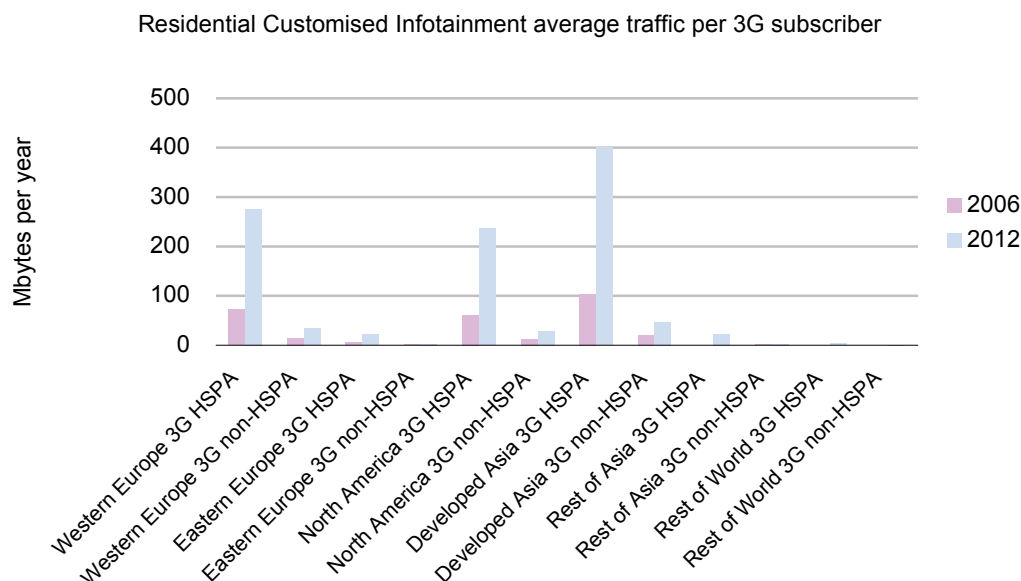


Figure 2-5 Forecast average traffic per 3G subscriber (non-HSPA/HSPA split) for residential Customised Infotainment services, 2006 vs 2012

Residential 3G HSPA-subscribers to Mobile Internet services are also forecast to have substantially higher usage than non-HSPA subscribers

Similarly to Customised Internet services, Mobile Internet services are expected to generate substantial traffic per user with HSPA subscribers generating considerably more than non-HSPA subscribers.



The average usage per subscriber of HSPA-based Mobile Internet services is expected to increase

- to over 160Mbytes per year in 2012 compared with just over 50Mbytes per year in 2006 in Developed Asia
- to over 110Mbytes per year in 2012 compared with under 40Mbytes per year in 2006 in Western Europe
- to just under 100Mbytes per year in 2012 compared with 30Mbytes per year in 2006 in North America.

By 2012 3G HSPA subscribers will be generating average traffic per user 7-to-9 times that of 3G non-HSPA subscribers as a result of higher quality user experience and lower tariffs.

Figure 2.6 shows the forecast average traffic per 3G subscriber (split non-HSPA/ HSPA) in 2006 and 2012 for residential Mobile Internet services.

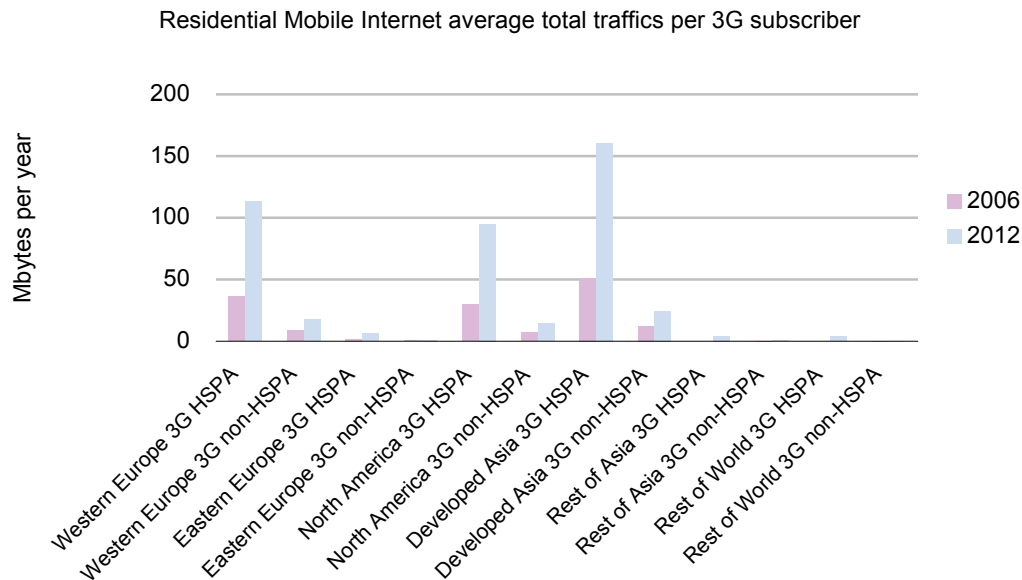


Figure 2-6 Forecast average traffic per 3G subscriber (non-HSPA/HSPA split) for residential Mobile Internet services, 2006 vs 2012

Average business subscriber traffic from HSPA Mobile Intranet/Extranet services will rise to five-to-six times the level of non-HSPA subscribers by 2012

Business users will benefit from the higher download and upload speeds offered by HSDPA/HSUPA. While such users are not as price-sensitive as residential segments a much greater premium is placed on performance and convenience. As a result the traffic of business Mobile Intranet/Extranet HSPA users will be substantially higher than non-HSPA users.

The average usage per subscriber of HSPA-based Mobile Intranet/Extranet services is expected to increase



- to over 380Mbytes per year in 2012 compared with 70Mbytes per year in 2006 in Developed Asia
- to over 350Mbytes per year in 2012 compared with around 65Mbytes per year in 2006 in Western Europe
- to over 220Mbytes per year in 2012 compared with just under 40Mbytes per year in 2006 in North America.

While the average level of usage of non-HSPA Mobile Intranet/Extranet services will also increase, by 2012 HSPA average usage per subscriber of these services will be five-to-six times the level of non-HSPA subscribers. An important secondary effect will be that business users of Mobile Intranet/Extranet services will also make more use of other services (such as Mobile Internet and Customised Infotainment) as a result of being connected for the purposes of accessing company files.

Figure 2.7 shows the forecast average traffic per 3G subscriber (split non-HSPA/ HSPA) in 2006 and 2012 for business Mobile Intranet/Extranet services.

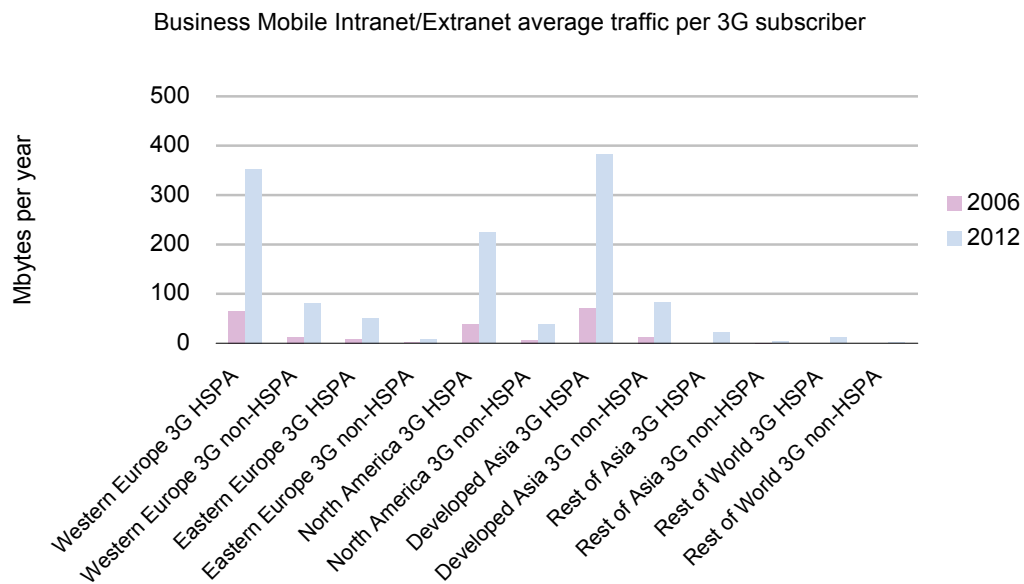


Figure 2-7 Forecast average traffic per 3G subscriber (non-HSPA/HSPA split) for business Mobile Intranet/Extranet services, 2006 vs 2012

3 By 2012 we forecast an HSPA subscriber base of one billion generating revenues of EUR56 billion

This report follows the categorisation developed in previous UMTS Forum reports and splits data services into five categories comprising:

- **location based services** – a service which makes use of the ability to detect the location of a user's mobile phone in order to provide location-specific services such as directions to the nearest coffee shop or the ability to track the location of other specified users/shipments etc
- **mobile Internet** – a consumer service providing full access to the Internet as well as file transfer, email, and streaming video/audio capability
- **MMS** – multimedia messaging service; includes picture messaging and video-clip messaging³
- **mobile Intranet/Extranet** – provides business users with access to corporate intranets as well as extranets
- **customised infotainment** – services provided over a mobile portal such as i-mode or Vodafone Live!; includes paid for information, free to air information as well as entertainment services such as ringtone or game downloads.

It is important to note that all forecasts of usage, ARPUs and revenues excludes circuit-switched voice, videotelephony and SMS.

³ In contrast to previous UMTS Forum reports, SMS is excluded from this category

3.1 By 2012 we forecast just over 20% of mobile subscribers will be active HSPA users – accounting for one billion users worldwide

Forecasts for likely future adoption of mobile services have been developed based on a ‘neutral’ view as to likely levels of service take-up over the period 2006–2012. In other words these forecasts are based on neither very aggressive or very pessimistic assumptions. Rather they represent a balanced assessment of the likely timescale for future adoption of services given the uncertainties that have to be taken into account.

The forecasts have been produced through a combined ‘bottom-up’ and ‘top-down’ approach. Bottom-up forecasts have taken out of a wide range of factors including:

- typical adoption rates for new technologies (and previous mobile services)
- constraints on adoption such as handset replacement rates
- churn rates
- benchmarks of actual ARPUs for individual services in each region
- consideration of the likely evolution of ARPUs as services became widely adopted.

Top-down estimates have provided cross-checks as to the reasonableness of the bottom-up forecasts – for example in terms of overall levels of affordability evaluated in terms of projected levels of spend on mobile services as a percentage of GDP.

The forecasts have been based on actuals estimates for the level of adoption in each region at the end of 2005.

3.1.1 The number of mobile subscribers worldwide is forecast to reach 4.5 billion with 3G subscribers accounting for 2.0 billion of these by 2012

Over the period 2006–2012 the number of mobile subscribers worldwide is set to double as regions with low mobile penetration rapidly grow their subscriber bases. Increasingly subscribers



will take 3G services, particularly in the regions of Western Europe, North America and Developed Asia. HSPA will be adopted in most regions around two to three years after substantive deployment of 3G services.

The worldwide base of mobile subscribers is forecast to reach 4.5 billion by 2012 – compared with 2.3 billion in 2006 – largely driven by growth in the Rest of Asia region

We forecast that overall levels of adoption of mobile services will continue to rise across all regions driven by, for example

- increasing levels of service affordability
- increasing levels of service and handset attractiveness
- fixed-mobile substitution
- greater use of prepaid tariffs in markets with low levels of penetration.

North America with its current relatively low levels of mobile penetration (in comparison to other highly industrialised regions) but high levels of wealth is forecast to grow relatively quickly, overtaking adoption levels in Eastern Europe in 2008 and Developed Asia in 2010. By 2012 mobile penetration in the Rest of Asia region is forecast to reach the level of the Rest of World region (56–57%) as the growth of major emerging economies such as India and China facilitates higher levels of mobile adoption within respective populations.

Figure 3.1 shows the forecast growth of mobile penetration across the six regions of Western Europe, Eastern Europe, North America, Developed Asia, Rest of Asia, and Rest of World over 2005–2012⁴.

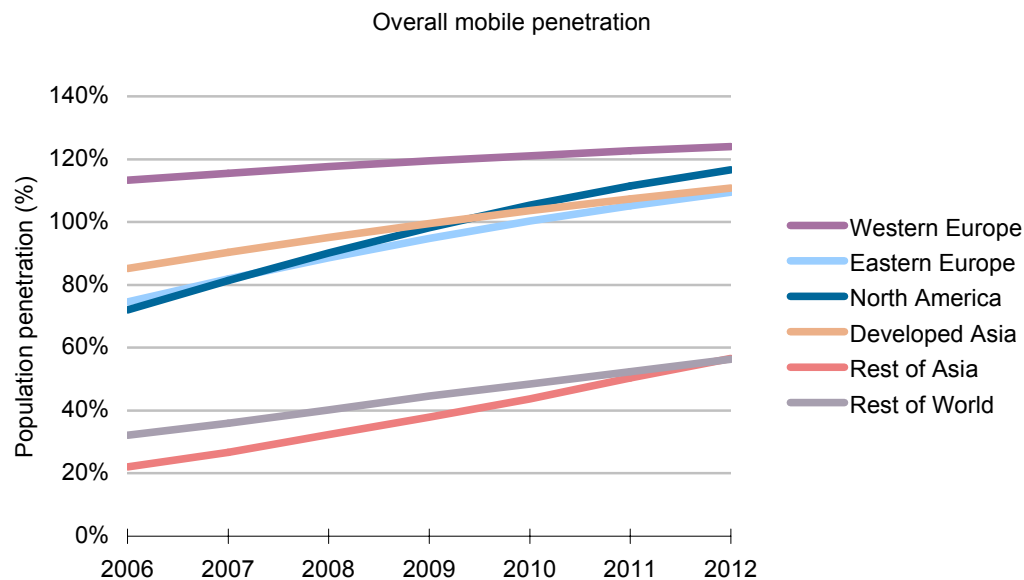


Figure 3-1 Forecast penetration of Mobile services by region, 2006-2012

This forecast increase in mobile penetration, in combination with growing populations in all regions except Eastern Europe imply a doubling of the worldwide mobile subscriber based over the period 2006–2012 from 2.3 billion mobile subscribers in 2006 to 4.5 billion in 2012.

Differences in the rate of penetration and population growth between regions imply a marked shift in the distribution of worldwide mobile subscribers by 2012. Western Europe is forecast to

⁴ For a full list of which countries are included in each region please see Appendix A.

increase its mobile subscriber base by 40 million subscribers by 2012 compared with 2006. At the other extreme, the Rest of Asia region is expected to increase its base by 1.4 billion subscribers over the same period as penetration reaches 57%. By 2012 the Rest of Asia will account for almost 50% of all mobile subscribers. The Rest of World region is also forecast to see substantial growth in the absolute level of mobile subscribers with 460 million more mobile subscribers in 2012 compared with 2006.

Figure 3.2 shows the forecast growth in all mobile subscribers split by region over the period 2006–2012.

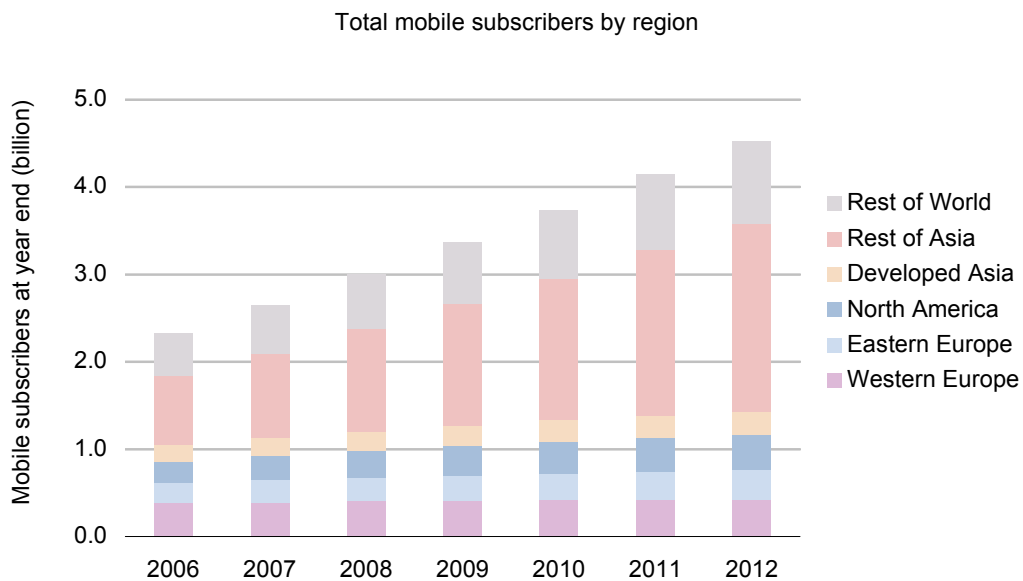


Figure 3-2 Forecast number of mobile subscribers by region, 2006-2012



Global 3G adoption is forecast to rise from 220 million subscribers in 2006 to reach two billion by the end of 2012

In forecasting 3G adoption levels particular account has been taken of

- the expected date of launch of 3G networks
- handset availability and handset replacement rates.

At the end of 2005, the Developed Asia region had almost a quarter of its mobile subscribers taking 3G services. This was substantially higher than in Western Europe where under 10% of mobile subscribers took 3G services. North America and the other regions had much lower (<2%) levels of 3G adoption. By end 2006 Developed Asia and Western Europe will be into periods of steady 3G subscriber growth with over 90% and 85%, respectively, of each regions' subscribers taking 3G services by end 2012.

Other regions had much lower levels of 3G adoption at the end of 2005 with North America having between 1–2% of its subscribers on 3G services. Eastern Europe, the Rest of Asia and the Rest of World regions all had substantially below 1% of their subscribers taking 3G services. From 2006 North America and Eastern Europe are forecast to see rapid growth in the proportion of their subscriber base taking 3G services as networks are rolled out and handset availability improves. By 2012 we expect both regions to be approaching Western European mixes of 3G subscribers. In the Rest of Asia and Rest of World regions the proportion of subscribers taking 3G services will take longer to grow as affordability and the later launch of 3G services delay user adoption

Figure 3.3 shows the forecast penetration of 3G subscribers within the overall base of mobile subscribers (note this differs from 3G population penetration).

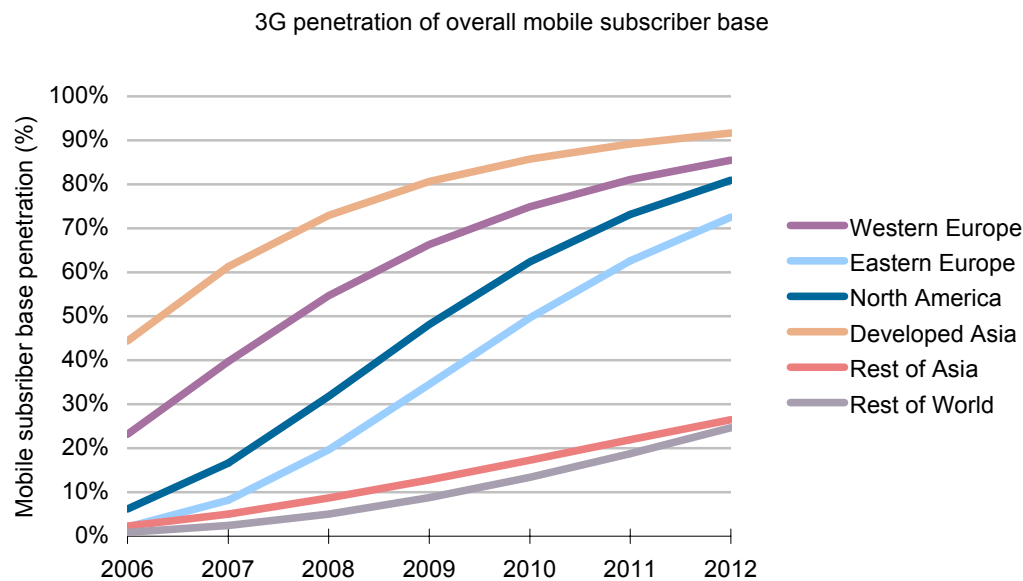


Figure 3-3 Forecast proportion of mobile subscribers in each region taking 3G services, 2006-2012

As a result of an increasing proportion of the mobile subscriber base taking 3G services, the number of 3G subscribers worldwide will increase from 85 million at the end of 2005 to 220 million at the end of 2006. By 2012 the total number of 3G subscribers worldwide will reach two billion. The Rest of Asia region will account for almost 30% (some 570 million) of global 3G subscribers by 2012, despite it having a relatively low proportion of mobile subscribers taking 3G services, due to the high number of mobile subscribers it will have in 2012. In comparison, Western Europe and Developed Asia together will account for over 80% of the global 3G subscriber base in 2006.

Figure 3.4 shows the forecast growth in 3G subscribers by region over the period 2006–2012.

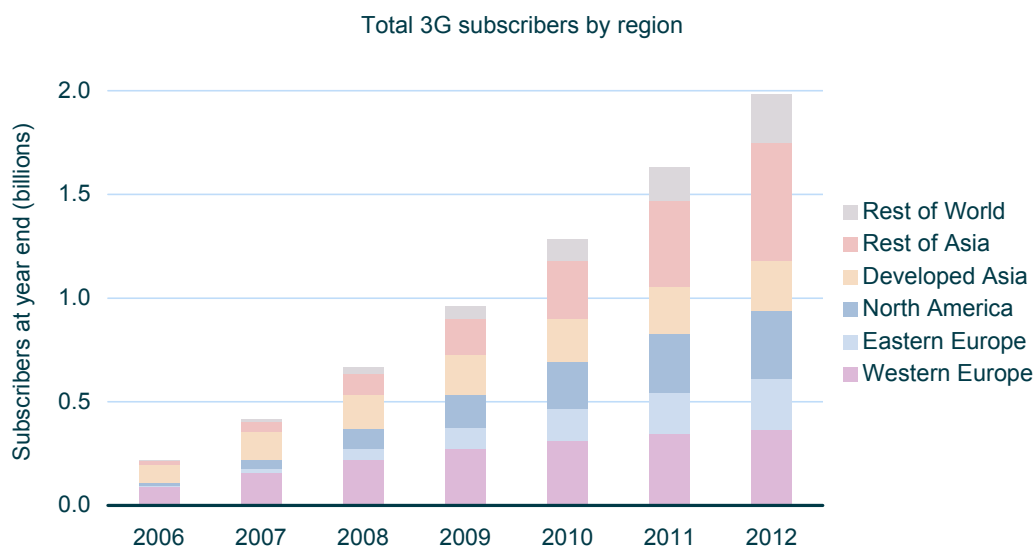


Figure 3-4 Forecast total number of 3G subscribers by region, 2006-2012

3.1.2 Within this base of 3G subscribers, the number of active HSPA subscribers is forecast to rise from under four million in 2006 to reach just under 1 billion by 2012

Initial adoption of HSPA services has been forecast based on operator announcements of expected commercial deployments and historic evidence from rates of adoption of 2.5G and 3G technologies⁵. Adoption over the period 2006–2012 has been forecast based on the availability of new services driving user adoption. However, as with the growth of 3G services, growth in the HSPA subscriber base will be constrained by the handset replacement rates. Adoption of HSPA

⁵ An HSPA subscriber is defined here as a mobile subscriber actively using an HSPA-enabled handset. CDM2000 based enhancements such as EV-DO are counted as part of non-HSPA 3G subscribers.

services will in general follow broadly the same timeline as that for the adoption of 3G services – but two to three years behind due to later network upgrades.

By 2012 we forecast that just over 75% of Western European 3G subscribers will make use of HSPA-enabled services. In Developed Asia and North America we forecast HSPA to account for just over 60% and just under 40%, respectively, of the 3G subscriber base in each region due to operators in these regions providing 3G-enhanced services over other technologies (i.e. CDMA2000 1x EV-DO). Substantive (over ~10%) adoption of HSPA services among the 3G subscriber base will not occur in the other regions until after 2009–2010.

Following low levels of adoption of HSPA services in 2006–2007 we forecast that the total HSPA subscriber worldwide will approach one billion in 2012.

Figure 3.5 shows the forecast split of 3G HSPA subscribers by region over the period 2006–2012.

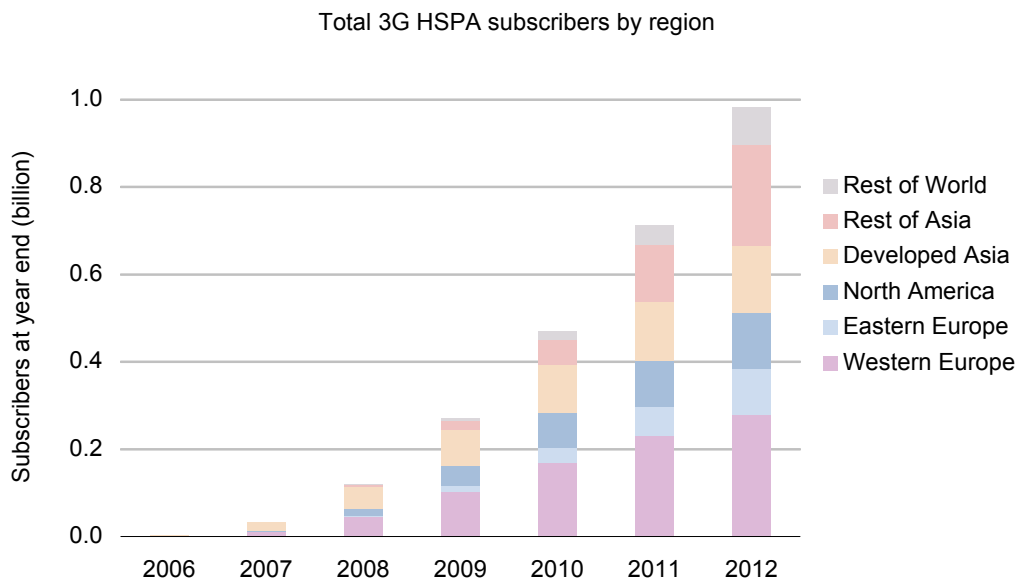


Figure 3-5 Forecast total 3G HSPA subscribers by region, 2006-2012

Subscribers are expected to begin to use HSPA-enabled handsets in Western Europe from 2007 and account for over 80% of 3G subscribers (280 million HSPA subscribers) by 2012

It will be 2007 before there is significant adoption of HSPA services in Western Europe. From fewer than one million HSPA subscribers at end 2006 as services are just beginning to be adopted, by the end of 2007 there will be over 10 million HSPA subscribers – rising to just under 280 million by the end of 2012. Availability of handsets and marketing of compelling services will drive adoption from 2007 onwards. From 2009 the number of non-HSPA 3G subscribers will be in decline as HSPA becomes predominant.

Figure 3.6 shows the growth and split of 3G subscribers between HSPA and non-HSPA customers in Western Europe over 2006–2012.

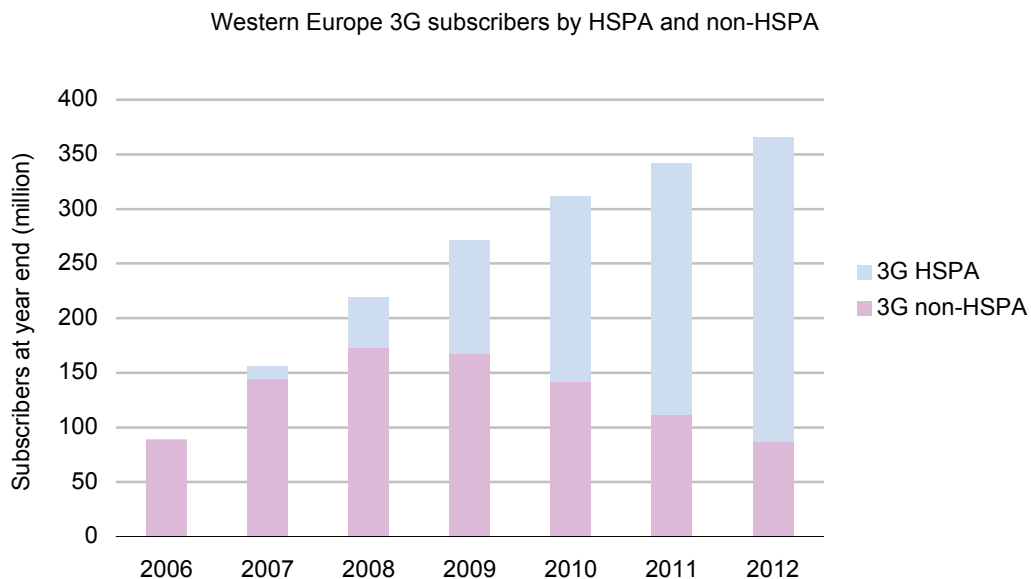


Figure 3-6 Forecast Western European 3G subscribers (HSPA vs non-HSPA split), 2006-2012

Roll-out and adoption of HSPA in Eastern Europe will be slower than in Western Europe and will follow the roll-out and adoption of 3G services

In the Eastern Europe region over 2006–2008 3G services will still be in an early stage of adoption. By 2008 just under 20% of mobile subscribers will take a 3G service compared with just over 2% in 2006. However from 2009 there will begin to be adoption of HSPA services as operators begin to properly launch and market services. Once services are launched we expect adoption of HSPA services to rise more quickly than in the early years of adoption in Western Europe as operators benefit from the lessons learnt from pioneer deployments in other regions and from wider availability of handsets. However the number of non-HSPA 3G service subscribers will still grow until 2011 when it will begin to plateau off.

Figure 3.7 shows the growth and split of 3G subscribers between HSPA and non-HSPA customers in Eastern Europe over 2006–2012.

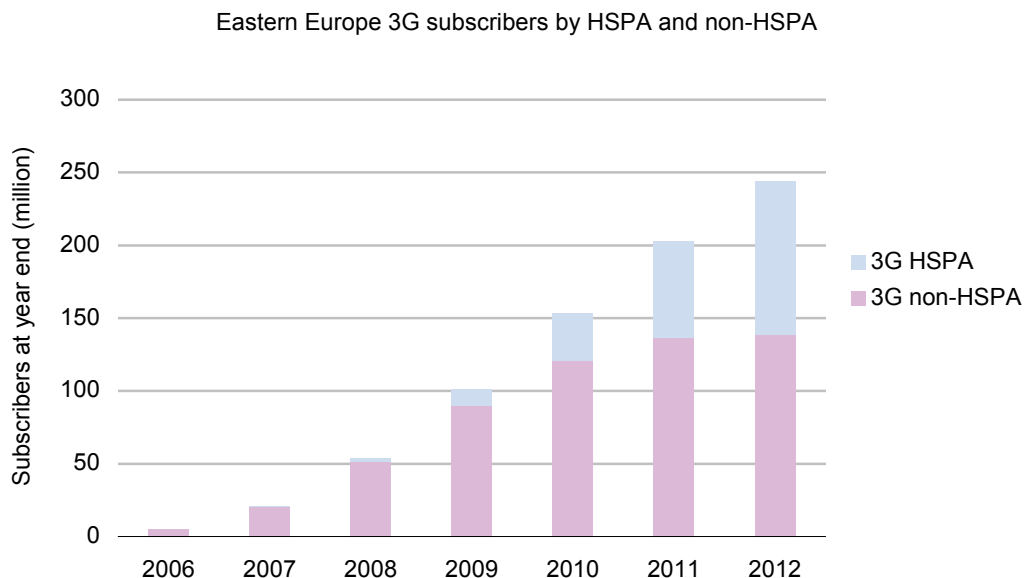


Figure 3-7 Forecast Eastern European 3G subscribers (HSPA vs non-HSPA split), 2006-2012



North American adoption of HSPA is expected to develop rapidly from 2008 to account for 130 million subscribers – over 45% of the 3G subscriber based – by 2012

North America will follow a timescale closer to Western Europe with HSPA services beginning to be adopted in substantial numbers by 2008 (around one year later than in Western Europe). In 2008 there will be 15 million HSPA subscribers in North America rising to 130 million by 2012. In these forecasts, it has been assumed that Sprint and Verizon's networks will continue to be based on the CDMA2000 family of technologies. The number of non-HSPA 3G subscribers will therefore continue to increase up to 2012 – with a growing proportion of these subscribers using CDMA2000 1x EV-DO before then migrating to subsequent upgrades based on the CDMA2000 platform. This assumption results in a relatively low proportion of total customers using UMTS HSPA when compared with other regions. Should one or both of the major US operators change their networks to become UMTS HSPA-based, this would significantly increase the number of HSPA subscribers in North America.

Figure 3.8 shows the growth and split of 3G subscribers between HSPA and non-HSPA customers in Northern Europe over 2006–2012.

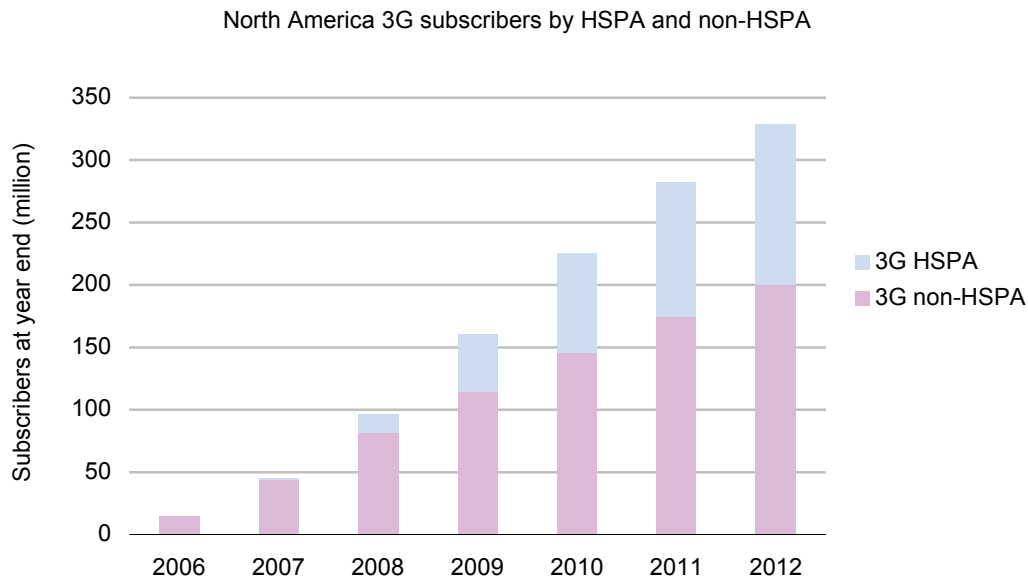


Figure 3-8 Forecast North American 3G subscribers (HSPA vs non-HSPA split), 2006-2012

With 3G subscribers accounting for over 20% of mobile subscribers at end 2005, Developed Asia is forecast to show the earliest significant adoption of HSPA services

The earliest significant adoption of HSPA services will be in Developed Asia where at end 2005 3G subscribers already accounted for over 20% of mobile subscribers in the region. By the end of 2007 there will be 20 million HSPA subscribers rising to over 150 million at the end of 2012. By 2012 HSPA subscribers will account for over 60% of the 3G subscriber base. The number of non-HSPA 3G subscribers is expected to decline from 2008. Figure 3.9 shows the growth and split of 3G subscribers between HSPA and non-HSPA customers in Developed Asia over 2006–2012.

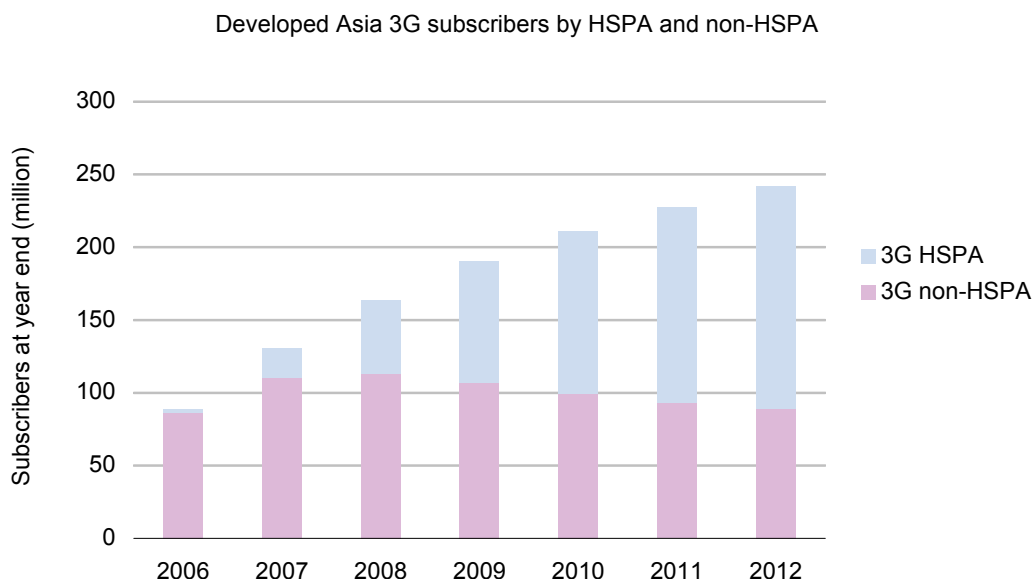


Figure 3-9 Forecasted Developed Asia 3G subscribers (HSPA vs non-HSPA split), 2006-2012

In contrast the Rest of Asia region is not expected to see significant deployment of HSPA until 2009 with 3G not expected to exceed 20% of total mobile subscribers until 2012

HSPA adoption in the Rest of Asia will be held back by the requirement to initially roll-out 3G networks and migrate customers onto 3G services. By 2012 3G subscribers will only comprise just over 20% of all mobile subscribers in the region.

However once 3G networks are deployed HSPA will be deployed more rapidly than in Western Europe and Developed Asia – it is expected that towards the end of the period some operators will deploy 3G networks with HSPA already enabled. From around just under 20 million HSPA subscribers at the end of 2009 by 2012 there will be just over 230 million subscribers. Over the entire period the number of non-HSPA 3G subscribers will continue to rise.

Figure 3-10 shows the growth and split of 3G subscribers between HSPA and non-HSPA customers in the Rest of Asia region over 2006–2012.

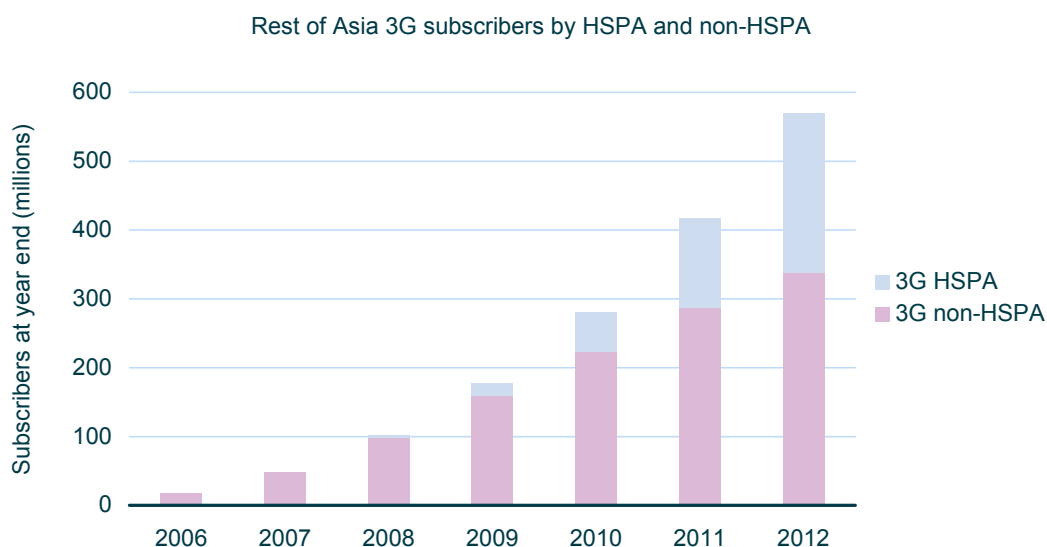


Figure 3-10 Forecast Rest of Asia 3G subscribers (HSPA vs non-HSPA split), 2006-2012

Similarly in the Rest of World region HSPA adoption is expected to follow growth in 3G services – by 2012 it is forecast to account for just under 10% of all HSPA subscribers

As with the Rest of Asia region, the Rest of World region will see adoption of HSPA services follow the gradual roll-out of 3G services. This region will only account for just under 10% of all HSPA subscribers by the end of 2012. Within this small base, however, adoption will grow rapidly from 2010 with the subscriber base rising from just under 20 million in 2010 to just over 85 million in 2012.

Figure 3.11 shows the growth and split of 3G subscribers between HSPA and non-HSPA customers in the Rest of World region over 2006–2012.

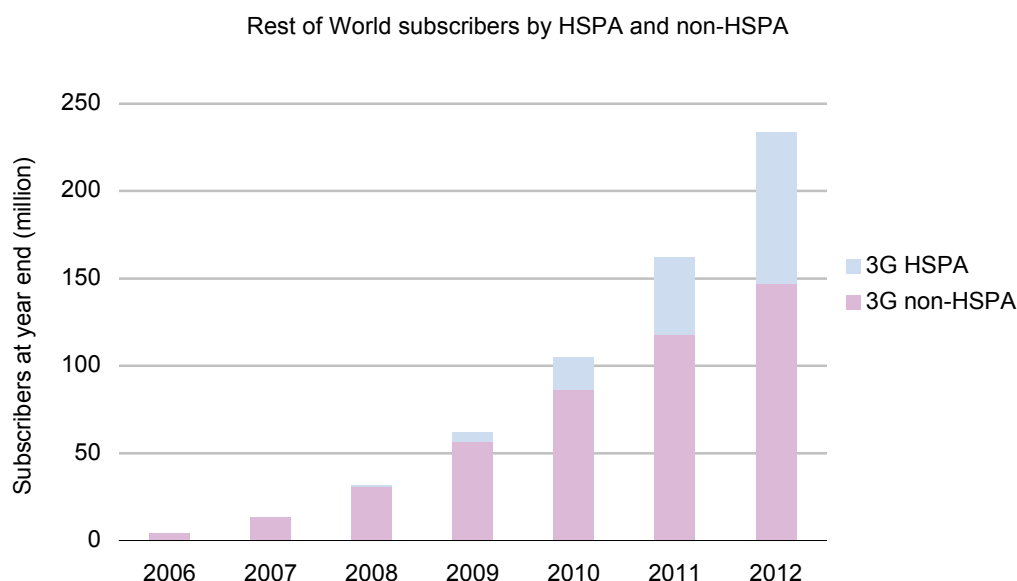


Figure 3-11 Forecast Rest of World 3G subscribers (HSPA vs non-HSPA split), 2006-2012

3.2 ARPU from mobile data applications varies widely between regions and is expected to reach EUR111 per user in Developed Asia, EUR88 in Western Europe and EUR58 in North America by 2012

There are substantial variations between regions in the level of 3G data ARPUs. Developed Asia is by far the leading region in terms of ARPUs from data services followed by Western Europe and North America. Data ARPUs in Eastern Europe, the Rest of Asia and the Rest of World regions are substantially lower.

Over the period 2006–2012, increased uptake and usage of 3G data services is forecast to increase 3G data ARPUs (including both HSPA and non-HSPA services) in all regions with the exception of North America. In North America 3G ARPUs are forecast to plateau off and marginally

decline from 2011 as higher competitive intensity causes tariffs to fall faster than increased uptake and usage can compensate.

Figure 3.12 shows the forecast total (HSPA and non-HSPA) annual data ARPU. All ARPUs are expressed as terms of annual, rather than monthly, ARPUs.

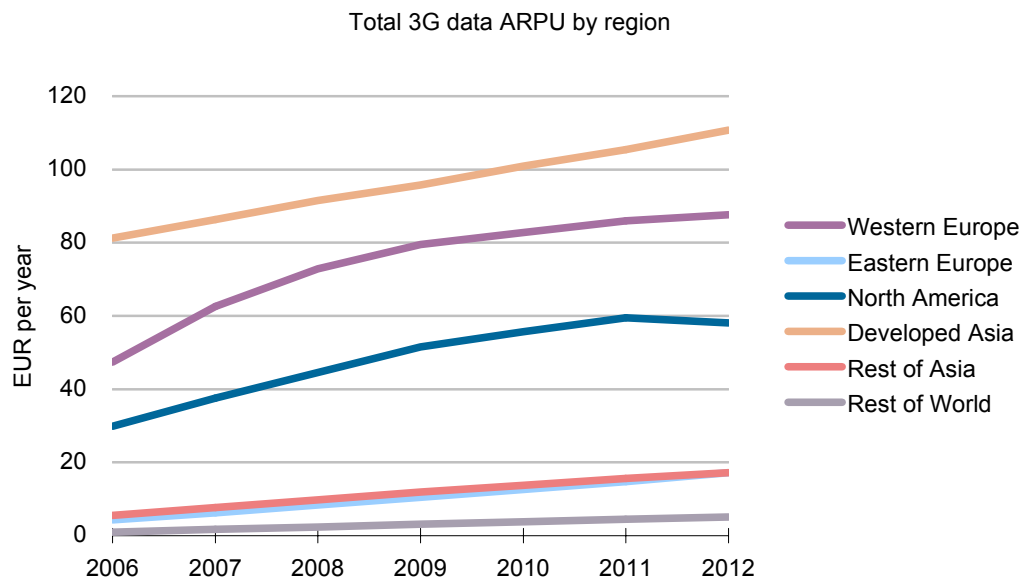


Figure 3-12 Forecast total 3G data ARPU by region, 2006-2015

3.2.1 The overall impact of HSPA-enabled usage will be to increase overall ARPU levels by 10–45% in different regions worldwide

As discussed in Chapter 2, there are a number of drivers to increased usage of data services, including

- falling tariffs



- improved user experience
- broader range of content
- increased user awareness of services

These will both drive increased usage of data services of non-HSPA 3G services over 2G/2.5G services and increased usage of HSPA 3G services over non-HSPA 3G services.

For all regions, the initial years of 3G service rollout will see non-HSPA 3G data ARPUs (excluding SMS) rising as increased use of services is made by subscribers. As competition continues to drive tariff declines, non-HSPA 3G data ARPUs in most regions will peak and then decline as growth in usage and adoption fails to compensate for tariff declines. However HSPA-based service ARPU will grow for longer as the improved quality of services supports tariff premiums over non-HSPA 3G data services. This 'ARPU uplift' of HSPA-based data services over non-HSPA services underlies the overall 3G ARPU growth forecasts for all regions until 2012 (with the exception of North America).

As this report focuses exclusively on non-SMS data services, the potentially large impact which HSPA could have on voice and SMS services is not assessed or quantified here. This impact should not be overlooked given that voice and SMS services will continue to make substantial contributions to overall subscriber ARPU over the forecast period. In practice, HSPA is unlikely to have an ARPU-neutral effect on either voice or SMS as the increased capacity of HSPA networks, for example, offers considerable possibilities to drive up usage of SMS and both 'simple' and 'rich' voice services through increased capacity resulting in lower costs and hence the opportunity to drive growth through price reductions and changes to tariff structures.

HSPA is expected to provide an increase over non-HSPA 3G data ARPUs in Western Europe that would otherwise be expected to decline from 2009 onwards

Residential non-HSPA 3G data ARPUs are forecast to increase from EUR42 per year in 2006 to reach a peak of EUR74 in 2010 from which they will decline to around EUR65 in 2012. Similarly

business non-HSPA 3G data ARPUs will increase from EUR78 in 2006 to a peak of EUR92 in 2009 before declining to EUR82 in 2012.

In contrast residential HSPA 3G data ARPUs will increase over the period due to increased usage of services. By 2012 residential HSPA ARPUs will have reached EUR94 in comparison with EUR47 in 2006. Business HSPA data ARPUs will reach EUR107 in 2012 from EUR86 in 2006.

In effect the introduction of HSPA services will provide an annual ARPU uplift of EUR29 for residential services and EUR25 for business services.

Figure 3.13 shows forecast growth in Western European 3G data ARPUs (non-HSPA versus HSPA) over the period 2006–2012.

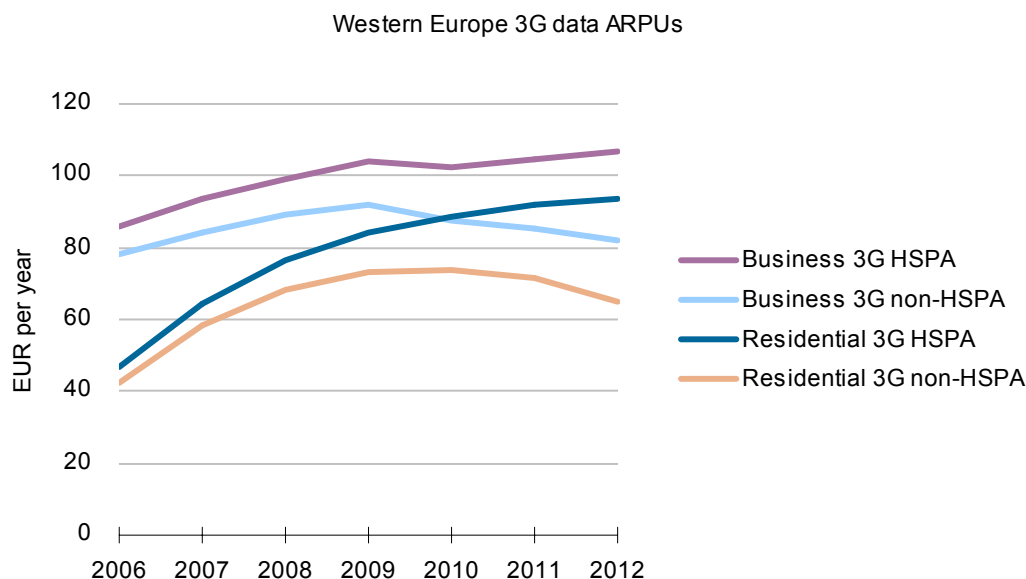


Figure 3-13 Forecast growth in Western European business and residential 3G ARPUs (HSPA vs non-HSPA), 2006-2012

In contrast in Eastern Europe non-HSPA 3G data ARPUs are still expected to grow over the period – HSPA services will, however, provide an ARPU uplift of around 40%

In comparison with Western Europe, as a result of the later stage of deployment of 3G networks in Eastern Europe, 3G ARPUs (both HSPA and non-HSPA) will rise throughout the period 2006–2012. From the relatively low level of annual ARPU of EUR4–5 for both business and residential HSPA and non-HSPA services, business HSPA ARPUs will reach EUR33 while residential HSPA ARPUs will reach EUR19. This represents an ARPU uplift of EUR11 and EUR6 respectively over non-HSPA 3G services.

Figure 3.14 shows forecast growth in Eastern European 3G data ARPUs (non-HSPA versus HSPA) over the period 2006–2012.

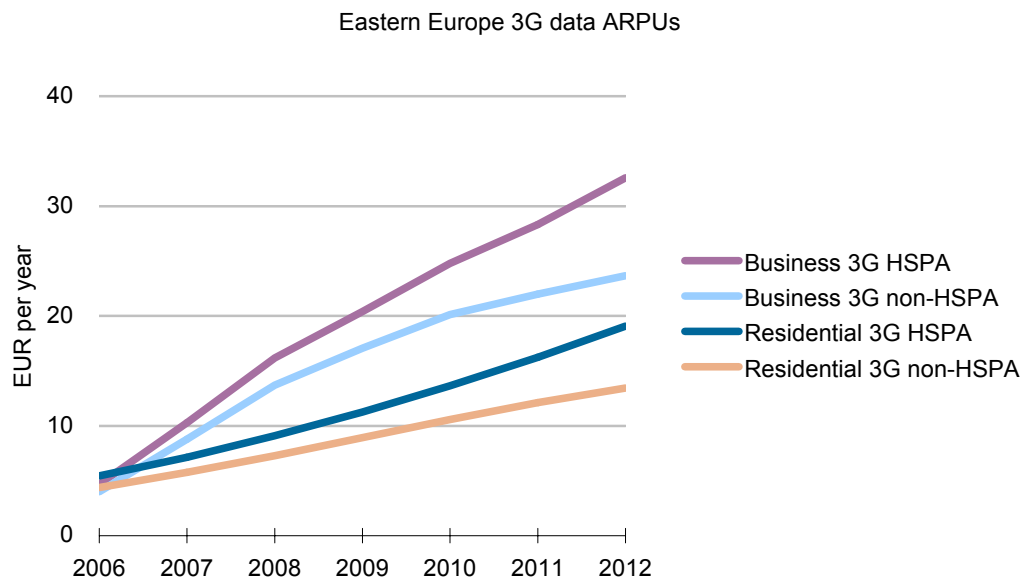


Figure 3-14 Forecast growth in Eastern European business and residential 3G ARPUs (HSPA vs non-HSPA), 2006-2012



While HSPA will provide an ARPU uplift in the North American region this will not prevent a decline in residential HSPA data ARPU from 2011

In 2006 3G ARPUs are forecast to be in the range of EUR28–32 per year for residential services and EUR34–37 per year for business services. By 2012 business data ARPUs will have reached EUR80 for non-HSPA services and EUR88 for HSPA services. HSPA will provide an uplift to ARPU of EUR8 per year for business data services with both sets of ARPUs forecast to increase over the period. In contrast both HSPA and non-HSPA residential data ARPUs are expected to peak at EUR63 and EUR48 respectively in 2011 as competition drives tariffs down. By 2012 ARPUs are expected to have fallen marginally to EUR62 and EUR46 with HSPA services providing an ARPU uplift of EUR24.

Figure 3.15 shows forecast growth in North American 3G data ARPUs (non-HSPA versus HSPA) over the period 2006–2012.

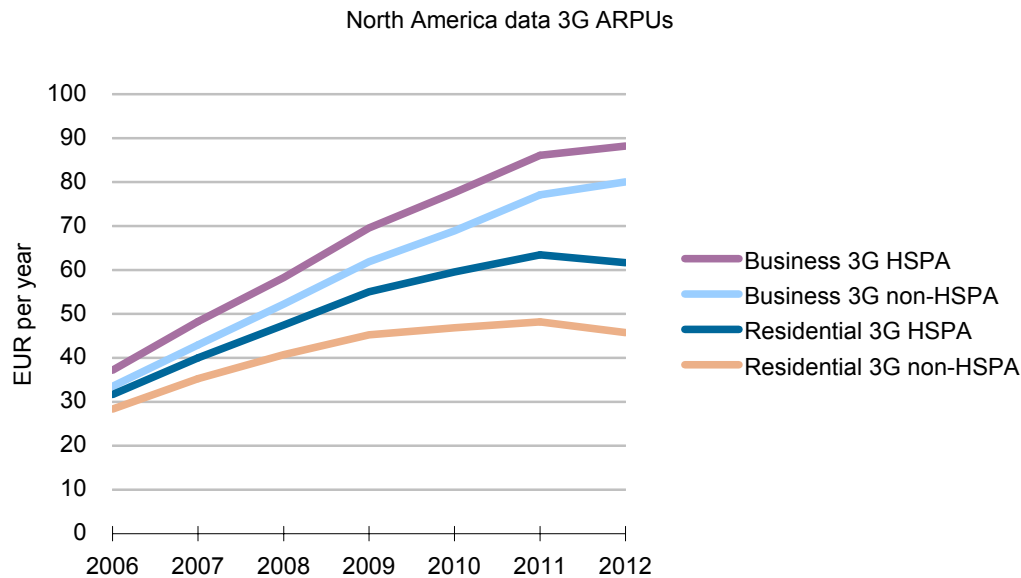


Figure 3-15 Forecast growth in North American business and residential 3G ARPUs (HSPA vs non-HSPA), 2006-2012

In Developed Asia, HSPA is expected to provide an uplift of over 20% to residential basic 3G ARPU by 2012 with high mobile data ARPUs continuing to rise gradually

Developed Asia is not forecast to experience such a considerable ARPU uplift from HSPA services as Western Europe and North America due to already high 3G data ARPUs (over EUR80 per year in 2006). By 2012 business HSPA 3G ARPUs will reach EUR128 (from EUR88 in 2006) – an uplift of EUR23 over the equivalent non-HSPA 3G data ARPUs. Similarly residential HSPA 3G ARPUs will reach EUR117 in 2012 (compared with EUR87 in 2006) – an uplift of EUR21 over equivalent non-HSPA 3G data ARPUs.

Figure 3.16 shows forecast growth in Developed Asia 3G data ARPUs (non-HSPA versus HSPA) over the period 2006–2012.

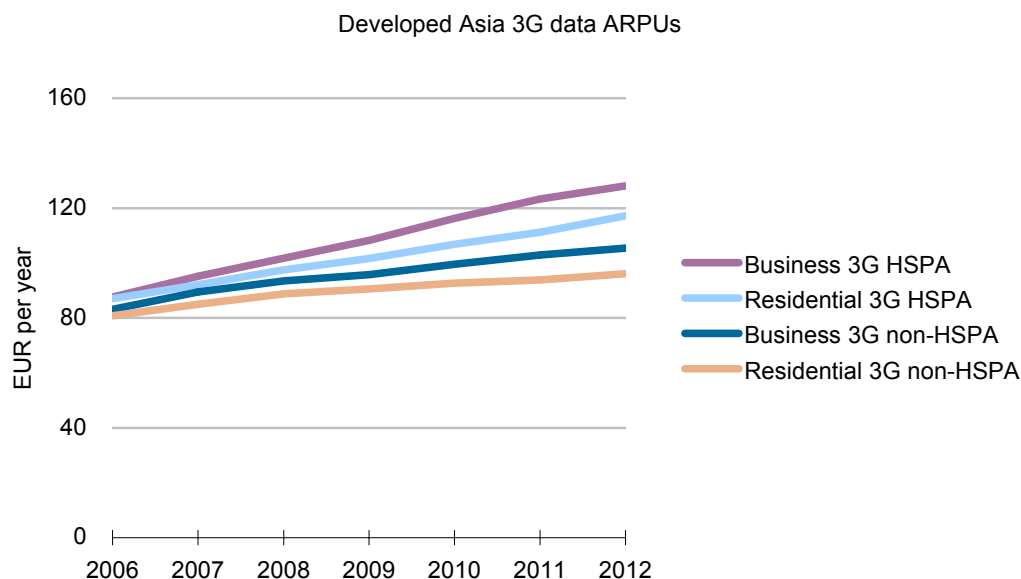


Figure 3-16 Forecast growth in Developed Asia business and residential 3G ARPUs (HSPA vs non-HSPA), 2006-2012

In the Rest of Asia region business 3G data ARPUs are expected to maintain a strong differential to residential ARPUs with HSPA providing a 35% uplift to business ARPU

3G data ARPUs in the Rest of Asia in 2006 will broadly be comparable to Eastern Europe in 2006 with residential 3G non-HSPA data ARPUs of EUR4 per year and business ARPUs of EUR8 per year. For residential users, over the period 2006–2012 affordability will be a constraint on the degree to which HSPA services can provide a substantial uplift to 3G non-HSPA ARPU. By 2012 residential HSPA 3G data ARPU will reach EUR10 – an uplift of just EUR2 over the equivalent non-HSPA ARPU. In contrast HSPA-enabled services for business users – less constrained by affordability – will lead to data ARPU reaching EUR38 in 2012 in comparison with EUR28 for non-HSPA services (an ARPU uplift of EUR10).

Figure 3.17 shows forecast growth in Rest of Asia 3G data ARPUs (non-HSPA versus HSPA) over the period 2006–2012.

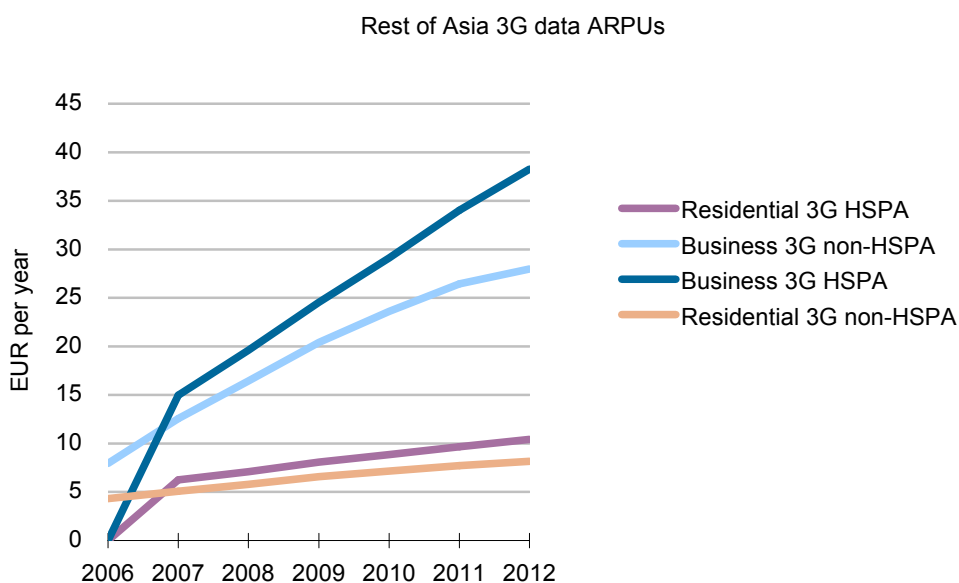


Figure 3-17 Forecast growth in Rest of Asia business and residential 3G ARPUs (HSPA vs non-HSPA), 2006-2012

HSPA is not expected to provide any significant uplift to regionally low residential 3G data ARPUs – as with the Rest of Asia region, by 2012 business 3G ARPUs will see an uplift.

A similar picture to the Rest of Asia will be seen in the Rest of World region, with affordability providing a limit on the growth of residential 3G ARPUs over the 2006–2010 period. Both HSPA and non-HSPA data ARPUs will increase broadly in line with each other. However business data non-HSPA ARPUs will show a more prominent uplift effect from greater usage and adoption of non-HSPA services. In 2012 HSPA 3G business data ARPU will reach EUR17 – an uplift of EUR3 over equivalent non-HSPA ARPU.

Figure 3.18 shows forecast growth in Rest of World 3G data ARPUs (non-HSPA versus HSPA) over the period 2006–2012.

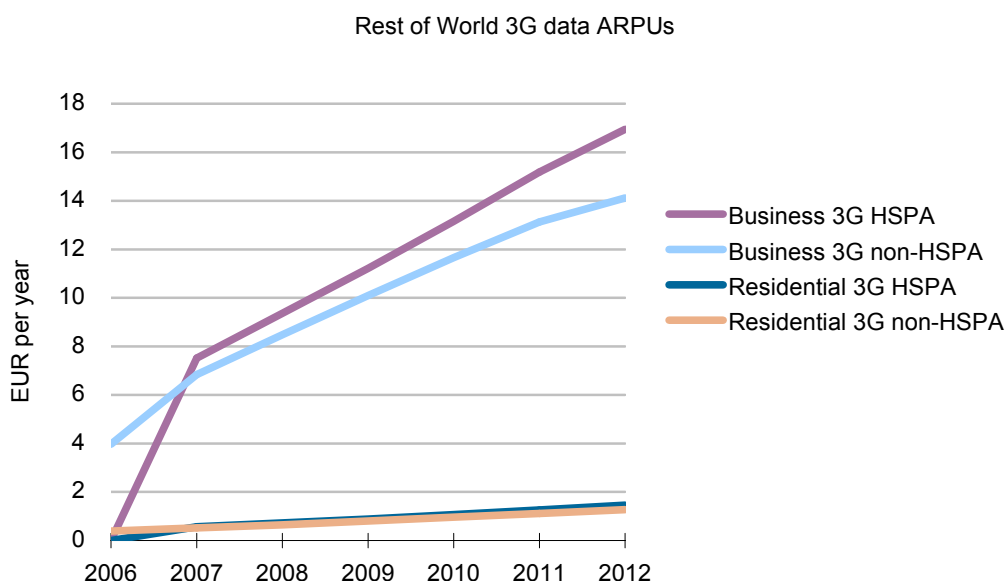


Figure 3-18 Forecast growth in Rest of World business and residential 3G ARPUs (HSPA vs non-HSPA), 2006-2012

3.3 Overall spend on HSPA-enabled data services will reach EUR56 billion by 2012 – accounting for just under 50% of all 3G spend

Voice and SMS services will remain the predominant source of mobile revenues across all technologies (both pre-3G and 3G) up to 2012. However spend on data services will account for an increasingly significant proportion mobile revenues. By 2012 HSPA-enabled services will account for almost 50% of the global spend on 3G data services.

3.3.1 Overall spend on 3G mobile data services worldwide is forecast to increase from EUR17 billion in 2006 to EUR120 billion in 2012

By 2006 total revenues from 3G data services will reach EUR17 billion. Growth in adoption and, over the first few years of the period 2006–2012, growth in ARPU in all regions will lead to robust growth of revenues from 3G data services. By 2012 total 3G data revenues will reach EUR120 billion.

More advanced adoption rates and higher ARPUs in Western Europe, Developed Asia and North America will lead to these regions accounting for over 80% (EUR100 billion) of these global revenues.

Figure 3.19 shows forecast revenues from 3G mobile data services by region over the period 2006–2012.

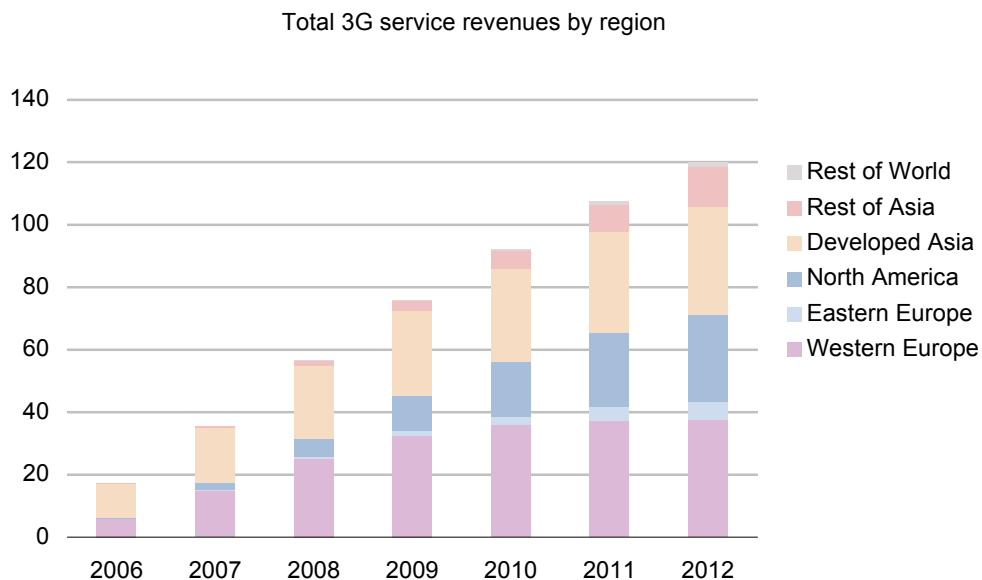


Figure 3-19 Forecast revenues from 3G mobile data services by region, 2006-2012



3.3.2 Global revenues from HSPA-enabled data services area forecast to exceed EUR56 billion by 2012 from EUR145 million in 2006

In 2006 HSPA-enabled data services will account for EUR145 million of global mobile revenues. As global penetration of HSPA services rises and usage of HSPA-enabled data services increases revenues will increase to reach some EUR56 billion by 2012. Regions will show variations in revenue distribution between services due to cultural differences between areas as well as due to technological factors.

Western European HSPA data revenues are forecast to exceed EUR24 billion by 2012 with residential Customised Infotainment revenues generating almost two-thirds of this

In Western Europe, residential Customised Infotainment revenues will account for the vast bulk of 3G HSPA data revenues over the period 2006–2012. In 2006 Western European 3G HSPA data revenues will account for just over EUR20 million – Customised Infotainment services will represent just under 70% of these revenues. By 2012 total HSPA data revenues will exceed EUR24 billion and at this point residential Customised Infotainment revenues will still account for just over 60% of total HSPA data revenues.

Figure 3.20 shows the forecast spend on 3G HSPA data services in Western Europe split by service over the period 2006–2012.

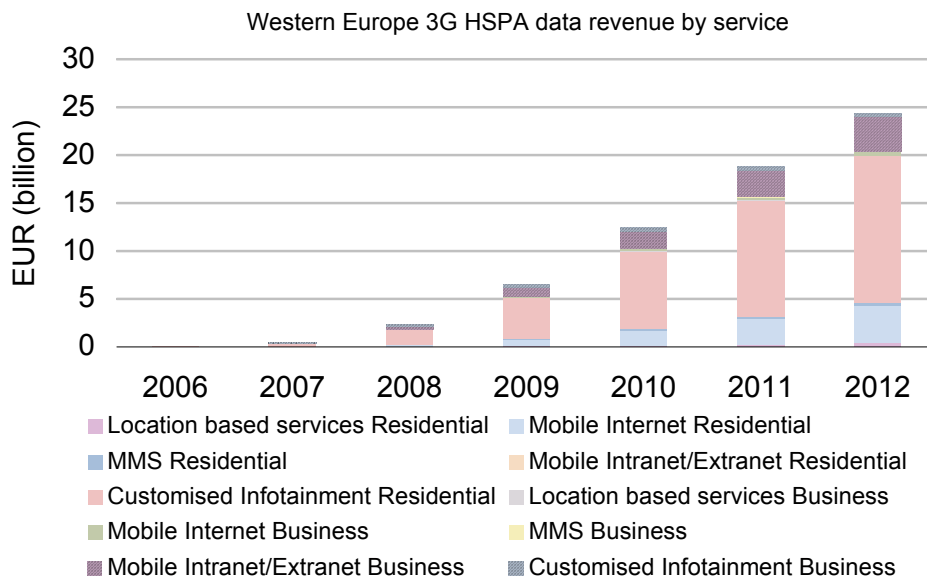


Figure 3-20 Forecast spend on 3G HSPA data services in Western Europe split by service category, 2006-2012



Eastern Europe HSPA revenues in contrast are forecast to reach just EUR1.8 billion – though again with residential Customised Infotainment revenues dominating

Later deployment of HSPA services in Eastern Europe will mean that this region will not achieve significant HSPA data revenues until later in the 2006–2012 period. By 2009 HSPA data revenues in Eastern Europe will approach EUR100 million while by 2012 revenues in the region will total EUR1.8 billion.

As in Western Europe, residential Customised Infotainment revenues will contribute the bulk of revenues over this period. In 2012 residential Customised Infotainment services will account for EUR1 billion of the total revenues. However in Eastern Europe residential mobile Internet HSPA services will be relatively more important than in Western Europe as high-speed mobile Internet access becomes more prevalent in the regional context of low fixed line (and thus low fixed broadband) penetration.

Figure 3.21 shows the forecast spend on 3G HSPA data services in Eastern Europe split by service over the period 2006–2012.

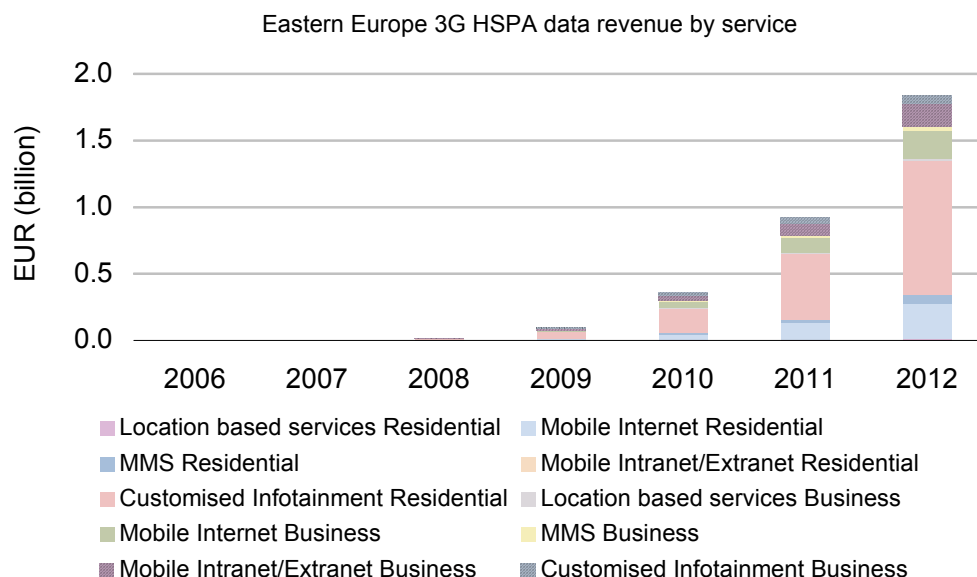


Figure 3-21 Forecast spend on 3G HSPA data services in Eastern Europe split by service category, 2006-2012

In North America, residential mobile Internet and business mobile Intranet/Extranet services will contribute relatively highly to total forecast revenues by 2012 of EUR8 billion

Growth in HSPA data revenues in North America will lag somewhat behind Western Europe. North American HSPA data revenues will reach EUR1.8 billion in 2009 rising to EUR7.9 billion in 2012. In addition to the significant contribution of residential Customised Infotainment services, North America will show relatively high contributions from business mobile Intranet/Extranet services and residential mobile Internet services. By 2012 these services will generate revenues of EUR3.0 billion.

Figure 3.22 shows the forecast spend on 3G HSPA data services in North America split by service over the period 2006–2012.

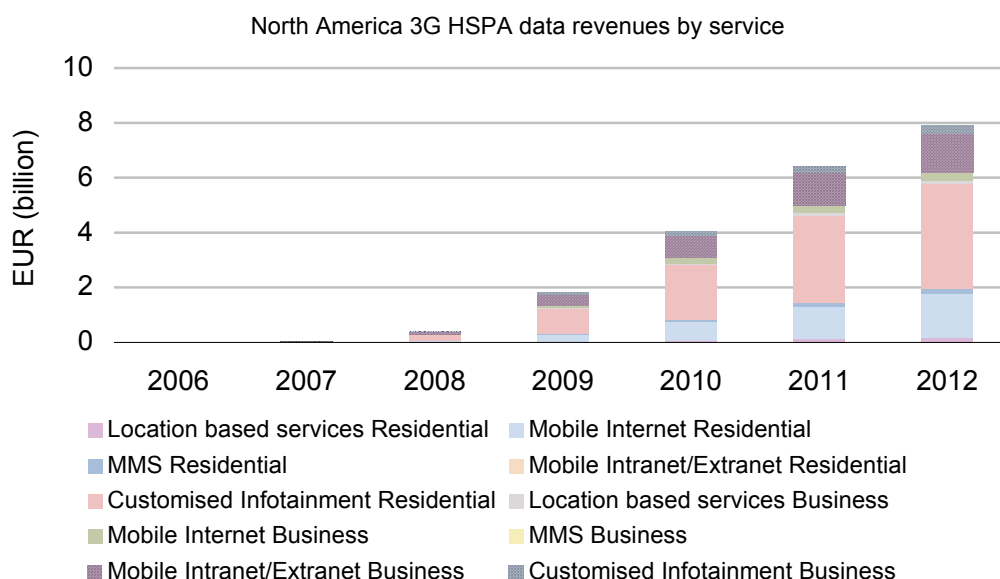


Figure 3-22 Forecast spend on 3G HSPA data services in North America split by service category, 2006-2012

In Developed Asia both residential mobile Internet and Customised Infotainment services will contribute the bulk of forecast revenues of EUR17 billion in 2012

Developed Asia will see the earliest generation of significant HSPA data revenues. By 2008 the region will be generating EUR3.5 billion in revenues (in comparison with EUR2.3 billion in Western Europe and under EUR0.5 billion in North America). By 2012 HSPA data revenues in Developed Asia will have exceeded EUR17 billion. In some respects the distribution of revenues in Developed Asia will be similar to that in Eastern Europe with residential mobile Internet contributing a significant proportion of overall revenues along with Customised Infotainment services.

Figure 3.23 shows the forecast spend on 3G HSPA data services in Developed Asia split by service over the period 2006–2012.

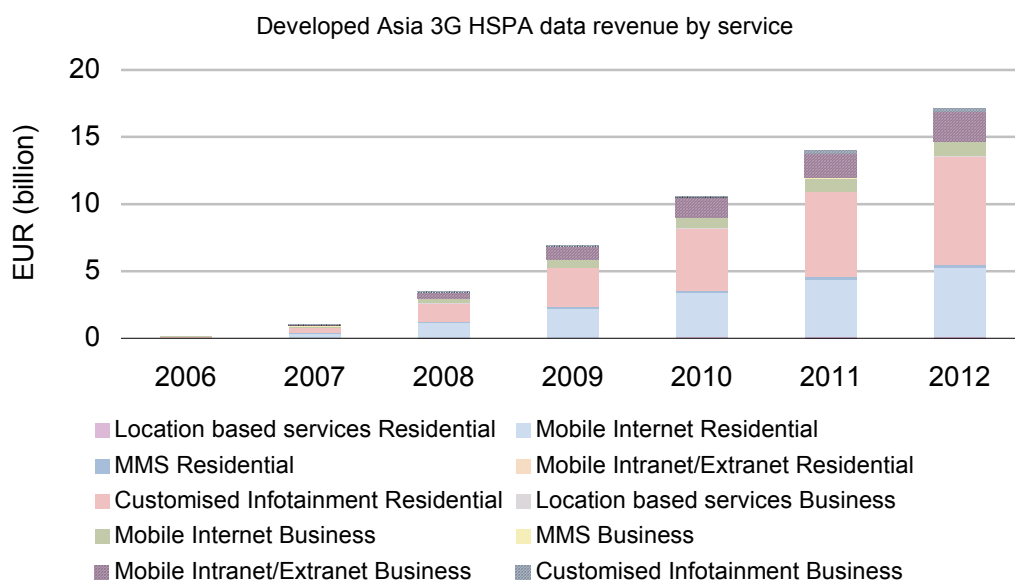


Figure 3-23 Forecast spend on 3G HSPA data services in Developed Asia split by service category, 2006-2012

The Rest of Asia – with slower initial adoption levels – will nonetheless reach total spend of over EUR4 billion by 2012

In the Rest of Asia region HSPA data revenues will only reach EUR0.7 billion by 2010 while by 2012 revenues will be over EUR4 billion. In contrast to Western and Eastern Europe, North America and Developed Asia, the Rest of Asia region will be driven to a much larger degree by business services due to affordability constraints in the residential market. Business Customised Infotainment services will contribute the vast bulk of revenues in 2012 – and substantially more than those generated by residential customers.

Figure 3.24 shows the forecast spend on 3G HSPA data services in the Rest of Asia region split by service over the period 2006–2012.

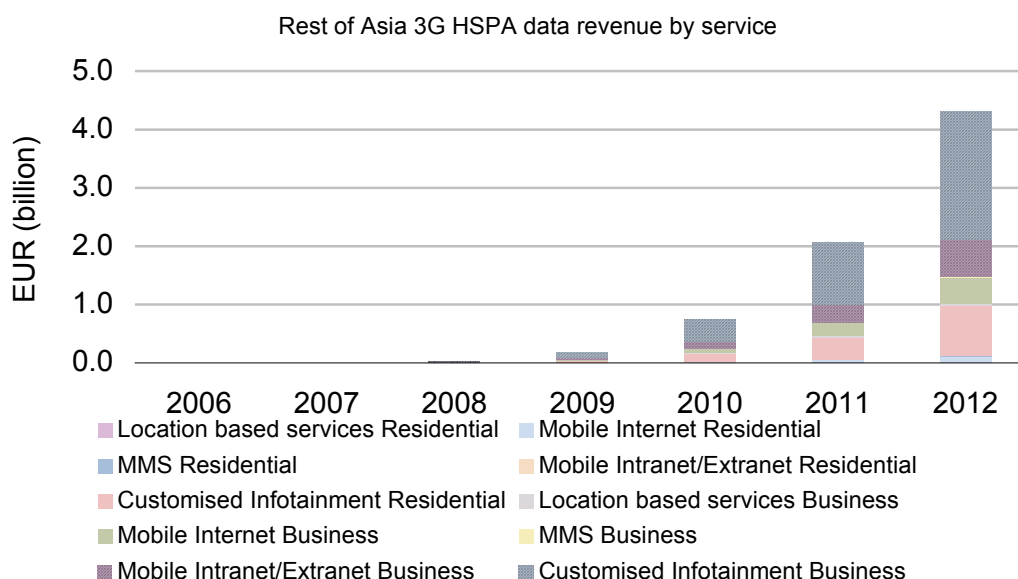


Figure 3-24 Forecast spend on 3G HSPA data services in Rest of Asia split by service category, 2006-2012

However the Rest of World region is not expected to see significant spend on HSPA data services by 2012 with overall spend only approaching EUR0.5 billion by 2012

As with the Rest of Asia, affordability constraints and later stages of deployment of HSPA services will lead the business sector to generate a much higher proportion of HSPA data service revenues in the Rest of World region up to 2012 than elsewhere. Significant revenue growth will not occur until after 2009 with total revenues reaching just short of EUR0.5 billion by 2012. As with Eastern Europe, mobile Internet services will be more significant as a result of lower levels of fixed line (and therefore broadband) penetration in the region.

Figure 3.25 shows the forecast spend on 3G HSPA data services in Rest of World region split by service over the period 2006–2012.

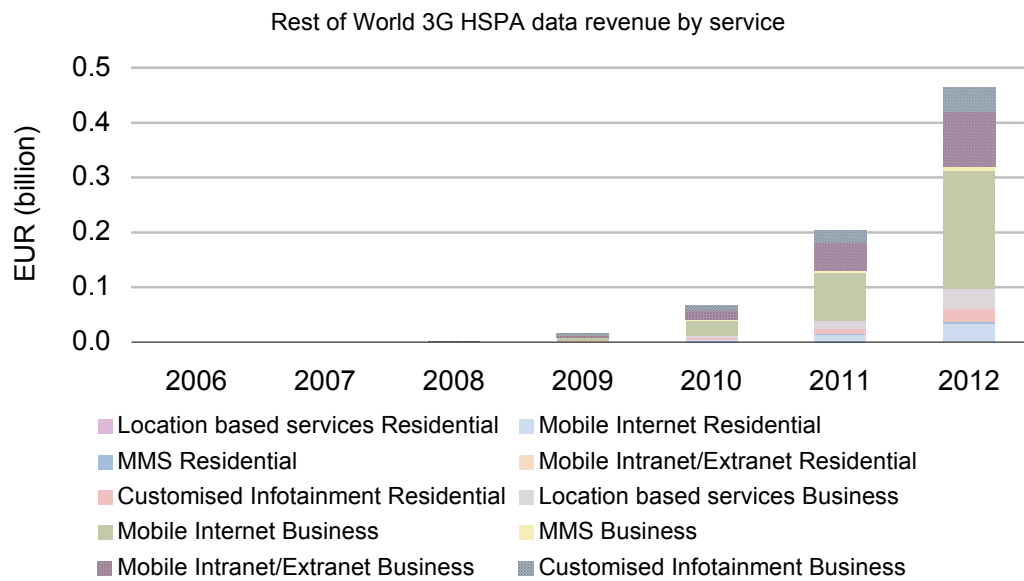


Figure 3-25 Forecast spend on 3G HSPA data services in Rest of World split by service category, 2006-2012



4 Conclusion

The UMTS Forum believes HSPA will become the world's leading 3G technology and will have one billion active users by the end of 2012.

The introduction of HSPA will make a significant contribution to growth in mobile data revenues over the period of 2006 to 2012. During this period the revenues associated with mobile data services can be expected to increase from Eur17billion to Eur120billion.

Of this improvement in mobile data revenues it is expected that HSPA will generate Eur56bn in mobile operators through stimulating data ARPUs by 2012.