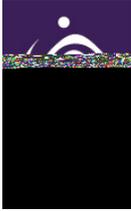


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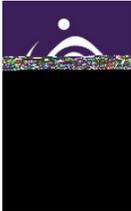


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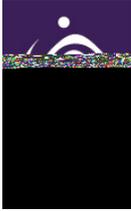


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The GSM Association (GSMA) and the UMTS Forum (UMTSF) recognise the future importance of Mobile TV technologies and how each solution places different constraints on the Business models

This report is the result a comprehensive study of various tangible / hypothetical business solutions carried out by the joint Group in order to better understand the business opportunities.

The report addresses amongst other issues:

- Sustainable Economics of Mobile TV services

*What the project is **not** intended to do:*

1. Develop strategies for individual operators;
2. Recommend the adoption of a particular technology;
3. Develop operator specific business plans;
4. Develop inter-working or harmonisation between any of the technologies.

The views, conclusions and detailed recommendations expressed in this Report are purely those found and expressed during the work of creating this document and exempts National Administrations who are UMTS Forum members from being bound by them.

First draft edition, revision 1.0

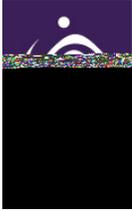
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Acknowledgement:

Special thanks go to all the active participants of the Working Group for their contributions and work in writing this document.



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Executive Summary

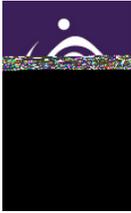
The business case for Mobile TV is not yet proven and yet operators are still keen to develop the service, the main reason being a firm belief that Mobile TV is emerging to be one of the next important mobile applications. Nearly all of the 3G mobile networks globally offer Mobile TV Unicast services which provide the ability to view video entertainment on mobile devices.

Early deployments suggest that more people are watching television on their mobiles than originally anticipated. At the moment, mobile subscriber numbers and volumes of video traffic are still low. However, the use of video on the Internet is growing exponentially and with more broadband access on cellular networks, it is becoming of high interest to cellular users as well. However, with increasing Mobile TV adoption, networks will become increasingly congested. To overcome the capacity problems of cellular networks, many operators worldwide are carrying out trials with complementary broadcasting technologies.

For the television industry, which is already trying to adjust to viewers who wish to watch not only on their TV screens but also on their computer screens, this means more upheaval. Content now needs to be formatted for three-screen viewing. To complicate matters further, there are several different ways to transmit this content to mobile phones.

In general, it is regarded as more efficient to “broadcast” the most popular live TV channels to all handsets in a given area using the same radio signal. One method is to use a separate radio network overlaid on the existing mobile network. Several different broadcasting standards are vying for supremacy. In America MediaFLO, the technology used by Verizon, is catching on fastest. In Europe the DVB-H standard is already in use in Italy and Finland. Other broadcast standards, some of them satellite-based, are in use in Asia. Another method is to develop a Mobile TV service and generate revenues and customer usage out of the current 3G deployment potentially upgraded with new 3GPP releases introducing Broadcast and Multicast (e.g. MBMS) and also hardware capability to mitigate capacity issues. It is also possible to combine the 2 methods to form a hybrid scenario where a 3G mobile network and a broadcast overlay network are used in conjunction to bring Mobile TV to the maximum number of users. Many Mobile Network Operators are still searching for a viable Mobile-TV model and secure return of investment, Mobile TV requires a complex eco-system, including content, encryption and authentication capabilities and for the business model to work collaboration amongst all parties.

The important thing to keep in mind is that behind the myriad of technology and content alternatives, mobile television is ultimately a service. Moreover, with any service, a quality experience has to be paramount or the service will not be able to sustain a competitive price. In addition, when it comes to Mobile TV, quality (like beauty) is in the eye of the beholder. Even seemingly minor issues like slow, jittery startup, taking too long (10 seconds) to switch into TV mode, and occasionally skipping a few frames can result in a poor user experience and a lost subscriber.



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The high-quality experience that consumers expect begins with bandwidth, which, in turn, translates to scalability within the network. Today's mobile networks were originally designed to deliver one-to-one services to subscribers. As a result, they have difficulty delivering bandwidth-consuming content to a large number of subscribers.

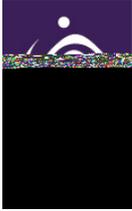
Content is considered the "Key" to the success of Mobile TV while it is experiencing a resonant quasi paradigm shift becoming more personal- to be manipulated, shared, and stored through a controlling mobile device making copyright infringement legislation more important than ever. This also will change the traditionally demanded (i.e. News and sports etc.) to something more exciting and close to online reality with integrated interactivity and special forms of advertising targeted at the user.

So, success in the Mobile TV sector will be measured not by offerings that seek to duplicate other video delivery and content strategies, but rather by unique features, functions and compelling content that make Mobile TV a distinct, revenue-generating application for next-generation mobile networks.

As stated above once the Mobile TV service has become popular in the market, mobile networks are typically not well suited to handle unicast traffic for the most popular TV channels especially in highly populated areas. This TV traffic could be handled via a broadcast capability. From both an economic and a radio spectrum point of view, sharing a broadcast overlay network is clearly the best way forward, instead of having multiple Mobile TV broadcasting networks. Consequently, cooperation between various market actors will be necessary. This white paper provides a generic business model as well as a short description of typical business relations between the key market actors. The business model makes a distinction between the broadcast infrastructure at one hand and a services domain at the other hand. Key actors within the services domain are the TV channels and mobile operators who rent capacity from the broadcast infrastructure operator for mobile reception.

This paper contains a quantitative business analysis for a hypothetical country, which is representative for the European Union. The business case provides a cost-benefit analysis for the broadcast infrastructure operator, the TV channels and for the Mobile Network Operators who work together in delivering Mobile TV services to MNO customers. As all three types of market actors do need to invest heavily into this new market, payback periods are in the order of 3 – 4 years. An overlay broadcast network will not be economically sustainable for coverage beyond 30 - 40% of population. As the remainder of the population gets their Mobile TV service delivered via unicast, those costs and revenues are not taken into account in the model.

Each country is unique in terms of size, demographics, user needs, and market actors. Hence, it would be inappropriate to provide "one size fits all" recommendations in this paper. However, this paper clearly illustrates that **the** key to success will be cooperation between market actors

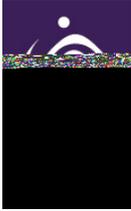


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leveraging mutual strengths and fairly spreading risks and rewards amongst each other and re-evaluating the business models constantly. The business performance, risk sharing and delivery goods of cooperating market actors will be mutually dependant and should be negotiated in a very early phase. It's like a waterbed: when one actor would agree to unfavorable terms and conditions, other market actors would benefit from this. To avoid this to happen, this paper could be used as a checklist to prepare for negotiations between market actors.

Should Mobile TV not gain the sustained level of uptake that stakeholders are counting on; operators will at least have put a greater number of data-centric handsets in their subscriber base, facilitating the uptake of other media services and created awareness for multimedia Mobile broadband innovative services to come.



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1 Introduction

Mobile TV refers to the transmission of audiovisual content to a mobile device¹. It has the potential to change profoundly the way in which consumers experience television and audiovisual services. It offers the possibility of viewing any content, any time, anywhere, and also provides for a new world of interactivity, where traditional and on-demand creative content consumption is supplemented by services tailored to the needs and tastes of each consumer. Mobile TV is at the crossroads of two powerful social trends, greater mobility, and new forms of accessing media content. It therefore could become one of the next high-growth consumer technologies.

The key differentiating feature of Mobile TV is an increased user mobility enabling the viewer to extend the place of watching from stationary to nearly every context. Many mobile operators offer linear Mobile TV and video services via their cellular networks. Mobile TV broadcast services are available in only a few countries. It should be stressed that for the end-user, it is completely irrelevant via which network TV and video services are being offered.

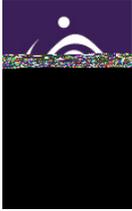
Analysts predict significantly increasing user acceptance of Mobile TV and video services. As opposed to home TV, the mobile is an individual interactive device. Current linear Mobile TV and Video on Demand (VoD) services are expected to evolve gradually towards a more holistic converged as well as interactive experience from which the user can pick and choose as he prefers. The user will be able to benefit from interactive services embedded in the evolving holistic user experience. Interactivity increases the average viewing time and creates interesting new opportunities for advertisers and content providers.

The holistic user experience will encompass live TV and radio services, redelivery services to which users can subscribe, as well as on-demand services. Meanwhile the underlying network infrastructures are expected to evolve to a seamlessly interworking combination of at least two of the following elements:

- cellular networks with ubiquitous coverage
- multicast network overlay of cellular networks
- terrestrial broadcasting networks in urbanized areas
- satellite broadcasting for large areas of outdoor coverage

The only way to achieve a ubiquitous TV coverage is through cooperation where market actors each take a specific role in the Mobile TV “eco-system.” This paper provides a generic business model, splitting infrastructure (requiring heavy investments) from the service layer. It is shown that the ‘MUX’ will play a pivotal in delineating activities requiring heavy investments and operational activities which are more driven by an annual cash flow target. The paper also provides an order of

¹ There are several devices available for receiving mobile TV but the most common one is the mobile phone. Brussels, COM(2007) final “Strengthening the Internal Market for Mobile TV-Definition for Mobile TV”



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magnitude estimate of costs and revenues illustrating the “economic limits” of the various infrastructures listed above. However, in order to make Mobile TV a truly successful service in the marketplace, a number of users, technology and business-related factors need to be addressed.

The related key questions are the following:

Which factors determine consumer behaviour and affect adoption of future Mobile TV services?

Which distribution technologies are required to support mobile TV and relax current network capacity issues?

Which broadcast, unicast and hybrid unicast/broadcast delivery models are required for efficient as well effective service delivery?

Service bundling: How can mobile TV be integrated with other data services to boost revenue potential?

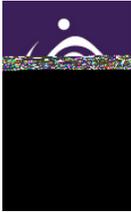
What are the key players and their roles in forming the Mobile TV business model?

What elements constitute a successful Mobile TV business case?

What are the lessons learned from Mobile TV trials and commercial deployments in Europe, Asia, and the U.S.?

This whitepaper aims on answering these key questions within a holistic framework. Starting with user and market perspectives, this work discusses Mobile TV and related complementary services as well as a generic business model and business case. Furthermore, it addresses relevant issues such as spectrum allocation, content rights & regulation as well as an assessment of the main risks threatening Mobile TV deployment. Finally, a summary chapter presents Mobile TV key success factors as well as recommendations for action to all key stakeholders.

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Figure 2.1: User Demand

During weekdays most people having a job (or going to school) have rather similar daily routines. After waking-up it is quite usual to prepare for the daily trip to the office (or school). Many people switch-on the television to watch the latest news as well as the weather forecast. A Mobile TV capable device can fulfil this need and enables more personal viewing behaviour patterns, as long as it manages to offer a convenient user experience as well as content that is relevant for the user.

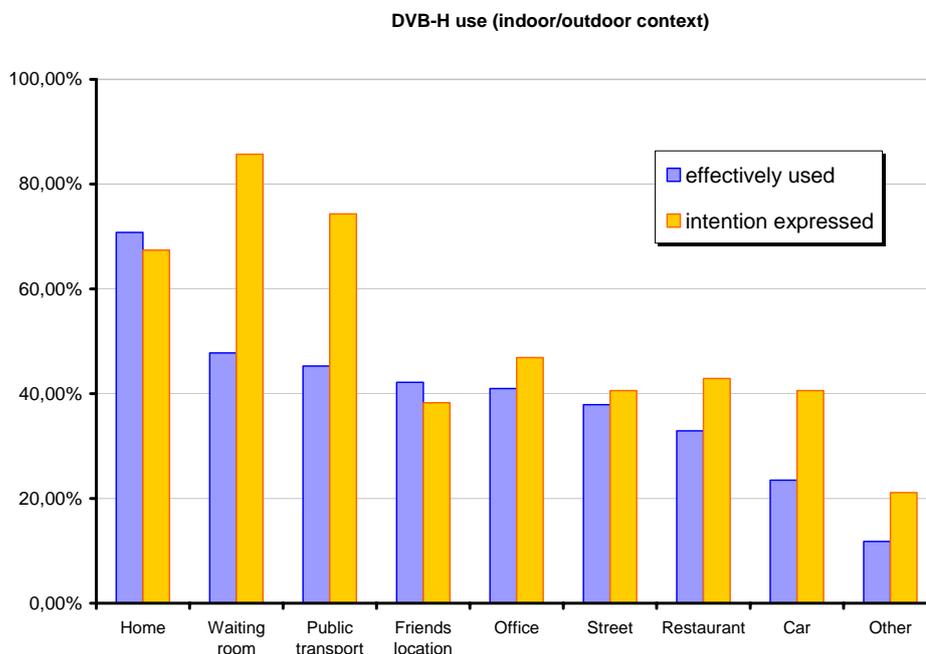
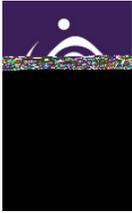


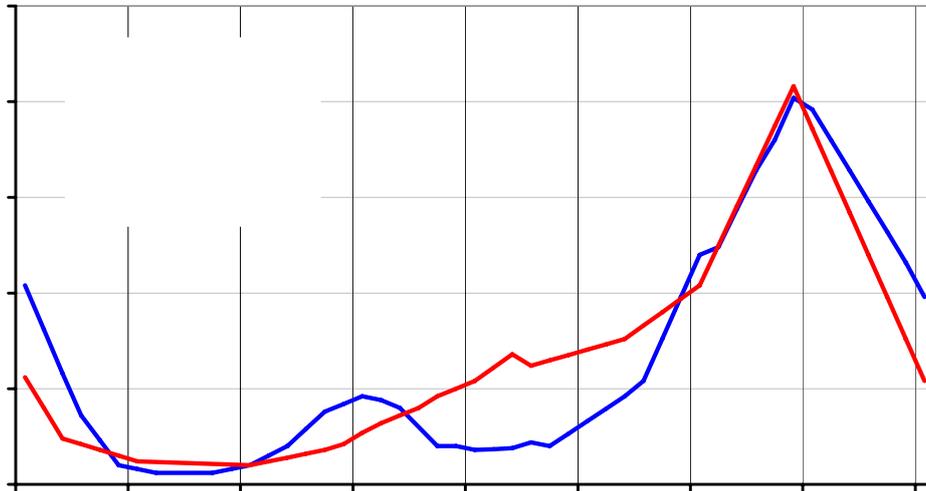
Figure 2.2: DVB-H Usage Locations Results from Trial in France
(Paris, Sep. 05 – June 06)

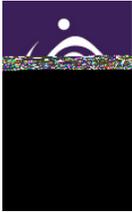
During their daily commuting, people generally want to make best use of their time while in transit. With regard to the mode of transportation a distinction needs to be made between the commuter being a driver and the commuter being a passenger. In the latter case the commuter has a lot of time to kill while being in transit. Apart from having a nap people are usually reading, listening to their MP3 player or playing a game on their PMP². Mobile TV in this context is an attractive alternative. Based on studies, most interesting Mobile TV content for watching on the move to /from work are news, general interest channels, music, humour, sports, etc.

² Personal Media Player
Version 1.0

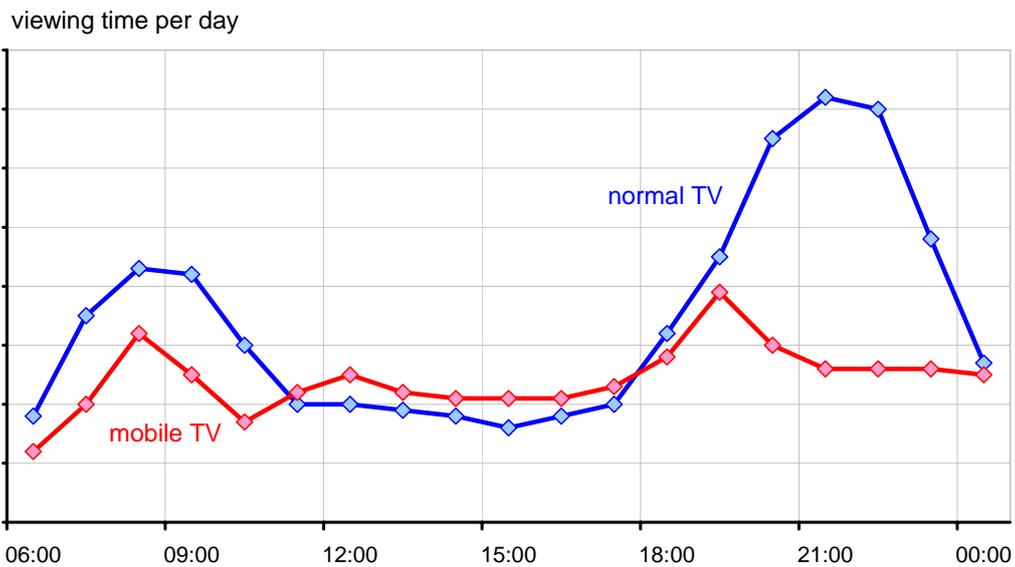


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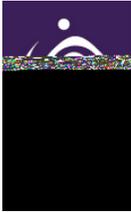


Source: TU-Media Sep 07

Figure 2.5: S-DMB versus linear TV consumption in Korea

The commercial S-DMB service in Korea has shown that Mobile TV comes with usage patterns that differ from terrestrial TV; it shows different peaks during lunch and the evening commuting. Although in absolute terms S-DMB yields less consumption than normal TV, the average daily usage is above 60 minutes per day. The figure below illustrates daily usage per age group of S-DMB services³.

³ Disclosed by TU-Media at the IMOBICON 2007 conference Seoul, 22 – 24 August 2007
Version 1.0



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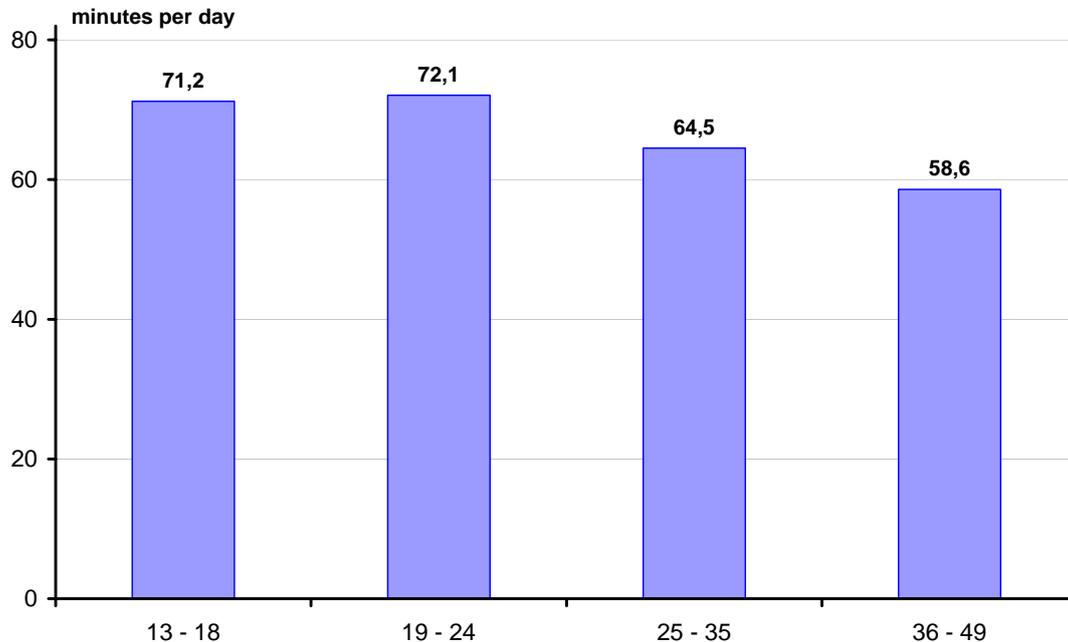
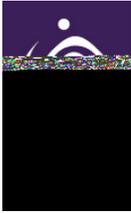


Figure 2.6: Usage pattern depending on age group – TU Media Sep 07

However, the transferability of such findings to for example, Europe is limited due to prevailing national and cultural differences concerning media consumption, mobile device usage and attitudes towards technology. Nonetheless, based on the experience in South Korea it can be validly expected that usage patterns for normal and Mobile TV will be different, since Mobile TV will particularly be used on the move and at work /school pause. In general, people do not want to miss anything; they want to stay informed all the time. For example during the 2007 French presidential elections the number of concurrent Mobile TV viewers was 8 times higher than normal. In Austria the Super G men tournament during the Ski World Cup generated three times more Mobile TV traffic than average.

During the evening at home, large screen(s) might be in use by other members of the household. Trials in Europe have shown that Mobile TV devices are frequently used as a personal TV at home for more variety and privacy in viewing. This finding reflects the aforementioned trend towards individualisation of media consumption. Furthermore this result calls for good indoor coverage in order to ensure best user experience for viewing at home.

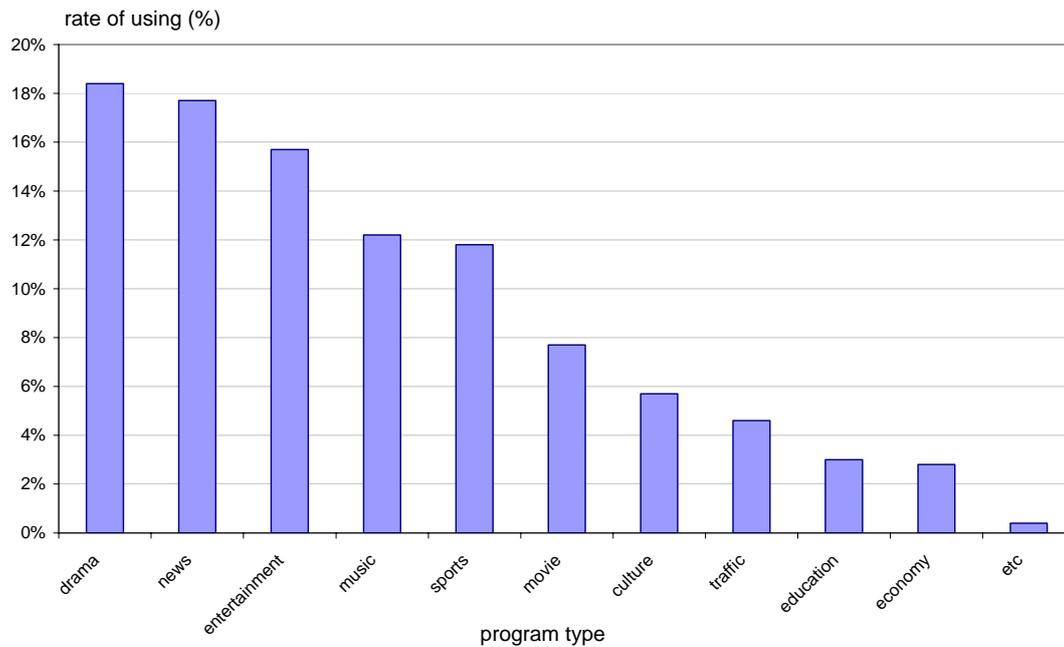
Interactivity in many cases can stimulate the usage of Mobile TV as participatory medium. For example, the plot of mobile soaps (mobisodes) can be influenced by interactive voting which enhances the viewer's involvement and attention. The world's first live trial on interactive Mobile TV services showed a doubling of average



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viewing time.⁴ Interactivity facilitates a richer Mobile TV experience as it leverages existing user behaviour.

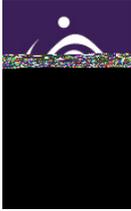


Source KBS, March 2007

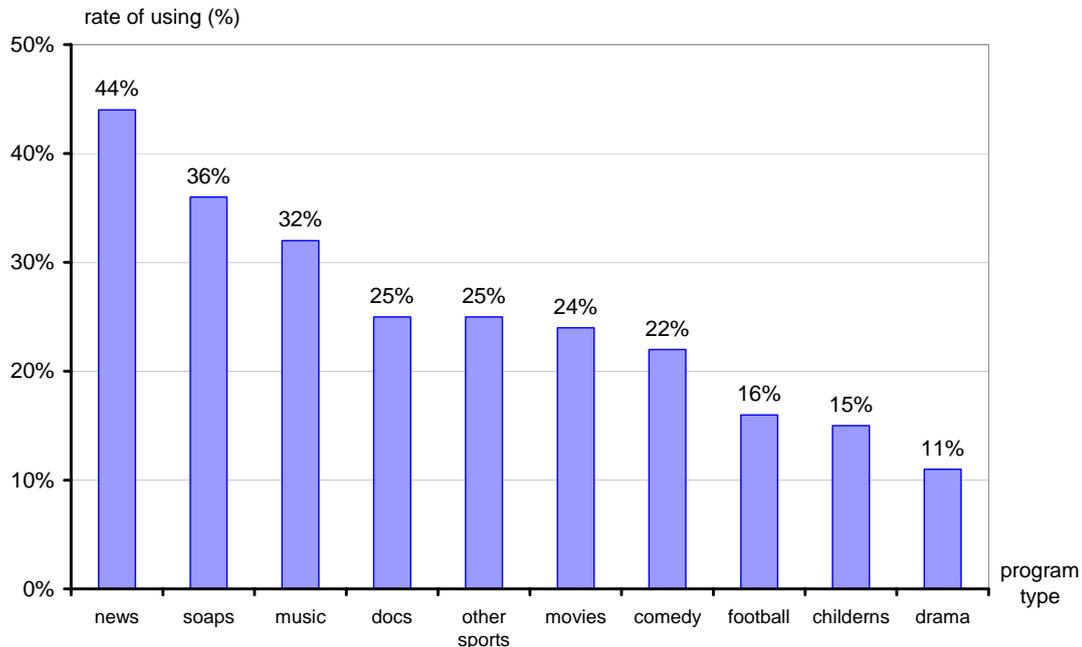
Figure 2.7: T-DMB content in Korea

The figure above shows the extent to which different categories of content are consumed in a developed Mobile TV market like Korea. News and sports are popular in South Korea and were popular in the various European trials (figure below) as well (e.g. UK trial). However, there are notable differences as well: drama is for example in top position in South Korea while it was in bottom position in the UK trial.

⁴ Field trial by Ericsson and the Norwegian Broadcasting Corporation (NRK).
Version 1.0



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Oxford, Oct. 05 - March 06

Figure 2.8: DVB-H General Selection Results from Trial in UK

At the recent Mobile Content World 2007 exhibition and conference held in Singapore drama serials, often not specially designed for the mobile channel, were found to be well received by Korean mobile viewers, but have not found the same success elsewhere.⁵ However, although South Korean TV content such as soap operas are currently popular on both traditional and mobile media platforms, in the long run Mobile TV content will develop its own unique characteristics.⁶

2.2 User Acceptance

For the customer, the perceived value of Mobile TV which directly translates into willingness to use the service is highly dependent on a variety of factors. The most critical ones are the following:

- **The ability to watch everywhere.** This key proposition of Mobile TV can only be delivered by guaranteeing wide population coverage and good in-building performance of reception. This strongly depends on a number of technical factors such as network planning, frequency band, terminal implementation.

⁵ <http://ai-interactive.com/article-606-mobilebroadcastinghandsontechnology-Asia.html>

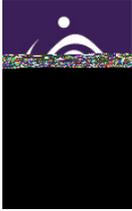
⁶ According to Suh Young-kil, president and CEO of TU Media (Korean Mobile TV broadcaster over S-DMB) at the Mobile TV Forum on the sidelines of CommunicAsia Wednesday



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- **Affordable and transparent pricing schemes.** Both initial costs (e.g. terminals) and recurring fees exert critical influence on the user's attitude towards adopting Mobile TV. The current popularity of monthly flat-fee schemes reflects the need for transparency while the need for low initial costs is addressed by attractive service bundling and device subsidization schemes.
- **Excellent picture and sound quality.** Mobile video must provide a high-quality user experience using media with higher resolution viewed on high-quality displays (with QVGA as minimum resolution). Likewise quality of audio needs to be good and adapted to the content.
- **High-quality content.** Users expect a certain number of channels and content genres, which must include the most popular set of free-to-air channels from terrestrial or cable programming relevant for the region. Beyond choice, the quality of the content itself is critical. Trials show that users do not accept second rate quality just because of the mobile medium. However, there is only limited evidence that users put a premium on dedicated made-for-mobile content.
- **A no-frills user-experience.** Handling the service should be easier than traditional terrestrial TV. An intuitive Electronic Service Guide offering an immediate overview of current and upcoming program events is a prerequisite. More advanced services like mosaic channel, recording functions, etc should be considered as well. Finally rapid setup, content playing by default (e.g. last channel) and a fast channel switching time are required as well.
- **Interactivity with low latency and click-through access.** Mobile TV should provide easy access to interactive services which truly adds value to the TV consumption experience.
- **Choice of device.** Adoption of the Mobile TV service requires a diverse choice of devices with an appropriate design at the time of its market introduction. However Mobile TV functionality will initially only be available on high-end devices and will gradually become a standard function on most devices over time. In general people don't want a new function like Mobile TV to compromise the basic handset functions (e.g. telephony and messaging).



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3 The market

3.1 Market review

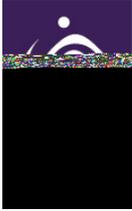
3.1.1 TV market⁷

Worldwide 1.1 billion households are equipped with a TV set, which represents 53% of all households, China accounting for almost one third. The world television market was worth € 250 billion in 2006; at that time the value of the European television market was € 72 billion. The annual growth of the TV market is around 6.5%. 49% of global television revenues come from advertisements, 41% from subscription fees and 10% from public funding (European values are respectively 42%, 34% and 24%). Although no significant changes are expected in these value share percentages over the next 5 years the percentage for public funding is expected to drop to 8.5% and 21% respectively for worldwide and Europe⁸.

Worldwide 57.5% of the population have access to free to air TV (Europe 57.5%). Approximately 4% of current households have digital TV (Europe 10%). These percentages are expected to double in the coming 5 years. The importance of digital TV via ADSL (i.e. IPTV) is expected to increase significantly from 0.5% to 3.1% of households (Europe respectively 1.5% and 7.7%).

3.1.2 Fixed internet market⁹

Internet access has now reached a mainstream audience in Europe, with almost half



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As the adoption of digital technologies grows throughout Europe, consumers will become increasingly empowered with enhanced capabilities to access information, interconnect, express themselves, and gain satisfaction on demand. This trend will present marketers with new targeting challenges. Investment in online media will increase rapidly—reaching €6.5 billion by 2010 — as marketers look to influence newly empowered digital consumers.

Between 2003 and 2005 the volume of internet bandwidth traffic doubled versus the previous 10 year total volume. In 2006 it doubled again because of the surge in consumer access to internet video. In 2006 YouTube's User Generated Content services used as much bandwidth as the entire internet needed in 2000¹¹.

As mobile operators upgrade their 3G networks with HSPA¹² technology the number of mobile users with access to real mobile broadband services is increasing rapidly. Customers now have and enjoy easy access to the Internet and other multimedia services at broadband speeds. They can enjoy real high-speed data connections available to them at anytime and anywhere, not depending on having access via a fixed line. This will bring a considerable potential of additional users and the introduction of new mobile services not limited by bandwidth or speed.

3.1.3 Mobile market

According to *Informa Telecoms & Media* the global cellular user base grew in 2006 by 26.3% (564 million users annual growth) to reach a total of 2.71 billion users in June 2007.

End of 2006 the global cellular penetration was 35% and is expected to increase in the coming 5 years with a growth rate of 6.2% per year to reach 3.1 billion users in 2011 which implies 49% penetration.

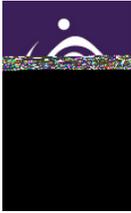
According to iDate "Telecoms in Europe" report from September 2007, at the end of 2006, Europe had 800 million mobile subscribers, or 104 subscribers per 100 inhabitants. Density had reached 111% in Western countries and 98% in Eastern Europe. 110 million new subscribers signed up during the year. This healthy growth (+23%) is largely due to the growing ubiquity of mobile services in emerging large markets like Russia, Ukraine, and Turkey.

European mobile revenues grew with 4.7 % from 162 to 173 billion euros. There was however a drop in European ARPU's – roughly 5% in Western Europe and 7% in Eastern Europe. This can be put down to two factors in particular: (1) growing competitive pressure on prices (2) regulatory measures to cut fixed-to-mobile call termination rates.

3G Subscribers worldwide grew to 137 million at the end of June 2007 showing a 95% annual growth and reaching an over all total of 64.5 million in Western Europe in comparison to APAC 62.2 million.

¹¹ <https://stats.linx.net/aggregate.html>

¹² High Speed Packet Access (HSDPA up to 14.4 Mbps and HSUPA 5,76 Mbps)



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Italy was the largest UMTS market in August 2007 with an estimated 24.5 million subscribers, compared with 12.8 million in the UK, 11.4 million in Germany and 9.5 million in France. In accordance with *Informa Telecoms & Media*, UMTS subscribers will grow to 250 million at the end of 2007 (of which 20 million will be broadband HSPA) and 980 million by the end of 2010 equivalent to 71% of all Wireless broadband connections.

North America saw the highest monthly ARPU from mobile data services worldwide, at US\$8.90 in 2Q07, according to Informa's World Cellular Data Metrics (WCDM). Total data revenues for North America stood at US\$6.97 billion in 2Q07, a 66% year-on-year increase.

Global data –ARPU remained stable at US\$4.20. The North America figures were boosted by a significant uptake of so-called “all-you-can-eat” data packages, almost a three-fold increase in 3G subscriptions year-on-year and rapid growth in SMS traffic.

In Japan, MNOs are best positioned to generate additional revenues by data services linked with Mobile TV due to the experience of subscribers with the Mobile Internet in Japan (see figure below).

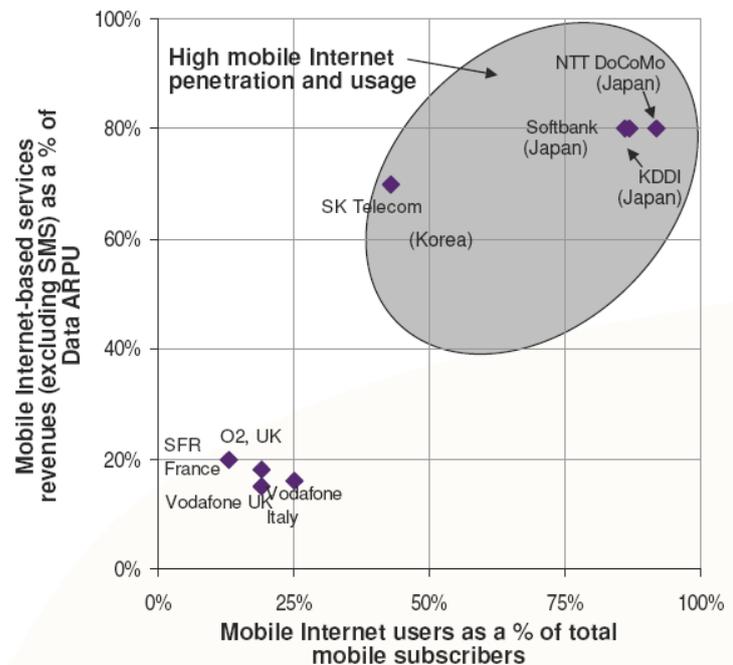
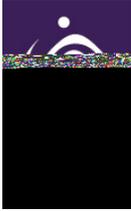


Figure 3.1.3: Mobile Internet users



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3.2 Mobile TV

3.2.1 The market today

With only a few million Mobile TV users out of a global total of around 2.5 billion cellular subscribers in 2006, prospects for growth are huge. However, the Mobile TV market is currently nascent.

In Europe there are approximately 2.5 million live Mobile TV users and an equal number of mobile Video on Demand (VoD) users. With the exception of the DVB-H infrastructure in Italy and to a limited extent the T-DMB infrastructure in Germany, live Mobile TV is delivered via unicast (i.e. streaming via cellular networks).

As of August 2007 there were about 6.8 million T-DMB devices (free of charge service) and 1.25 million S-DMB devices (premium service) in South Korea. 97% of the S-DMB and 39% of T-DMB devices are mobile phones. There are more than 8 million mobile VOD users in South Korea largely driven by flat fee mobile internet data service offers.

The free of charge 1seg Mobile TV broadcast service is embedded on Japan's digital TV infrastructure. The service was launched in April 2006 and approximately 7 million 1seg capable devices were shipped by the end of March 2007. The three mobile operators expect one of four mobile devices in Japan will be 1seg capable by March 2008.

In the USA MediaFlo has been operational since March 2007. Services are offered on a wholesale basis to Verizon and AT&T. Mobile TV broadcast subscriber numbers are not yet available but are claimed to be only 5000-10000 due to coverage limitations; also, programs such as college football have only just started.

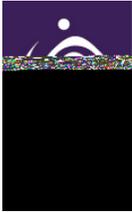
3.2.2 Market outlook

According to reports, service revenues from the global Mobile TV market are expected to exceed \$24bn annually by 2011, with Western Europe likely to lead in revenue terms at over \$10bn, followed by the USA and Canada at \$7.7bn, and China and the Far East lagging at \$5bn, despite higher usage levels¹³.

For example, by the end of March 2007 in Japan nearly 7 million mobile phones with embedded TV receiver have been sold and in Korea more than 5 million. This makes Japan the country with the largest number of people with a Mobile TV capable phone in the world. By March 2008 it is estimated that 27 million Japanese will have a Mobile TV-ready phone.

In Europe 3 Italia is currently running Mobile TV in regular operation with the highest number of users. Starting in June 2006 with their own DVB-H broadcast network 3 Italia reached about 700.000 subscribers by the end of August 2007.

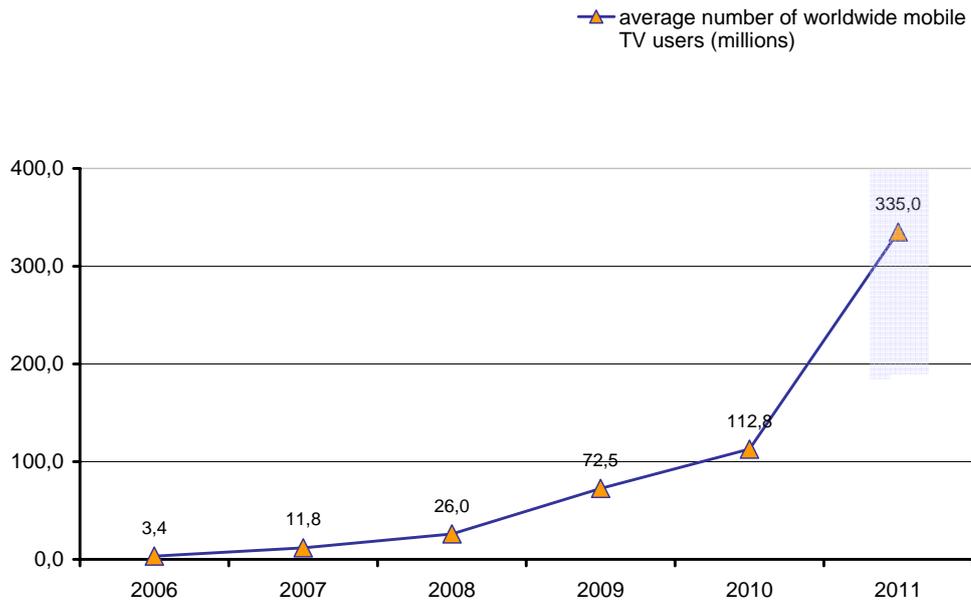
¹³ http://www.theregister.co.uk/2007/05/21/mobile_tv_report/
Version 1.0

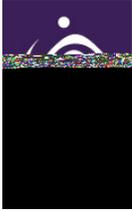


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Predictions of live Mobile TV subscribers and revenues worldwide differ widely between studies, but they all foresee a strong growth for mobile TV as shown in the next figure.



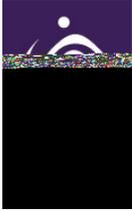


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favour of Mobile TV coming as soon as 2009, when revenue and subscriber figures of Mobile TV rocket and overtake 3G, while Europe maintains a lead position in the mobile entertainment market, producing an estimated share of 32% of total worldwide mobile entertainment revenues in 2011.

While market predictions focus on short term adoption of TV-like services where the user is passive, analysts think that Mobile TV usage will evolve to an internet type of usage. It is expected that in the medium term users will embrace more and more personalized content and interactivity. A NHK trial in Norway has shown that usage doubled due to interactivity.



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4 Mobile TV and related services

4.1 Introduction

Consumers do not care about particular Mobile TV technologies - they are primarily interested in the availability of high-quality information and entertainment while being on the move. Their needs can be met with a variety of services other than real-time broadcast, for example on-demand delivery, downloading, place- and time shifting. Therefore, this chapter expands prevailing notions of mobile live broadcast TV towards personal mobile media consumption by discussing a number of relevant trends and complementary services.

4.2 Trends

4.2.1 Convergence

Convergence is the ability to use the same services on any device at home, at work or while mobile. Content could, for example be shared between home and mobile devices. Also, home multimedia content could be accessed from the mobile regardless while being at home or out and about.

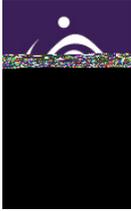
There is a growing popularity of triple play, offering voice, high-speed internet service and TV & VoD at home. Quadruple play is triple play plus a mobile service bundled in one offer. Convergence will enable many new service offerings.

For example, recent mobile multimedia devices do support "VGA out" via cable allowing the user to present the phone display on a large TV screen. One step further is the "wireless home" where WiFi enabled (mobile) devices can easily be connected based on the UPnP standard. Multimedia content stored or received on a mobile device can be viewed on the home TV and listened-to on the home stereo installation. In Japan millions of users can already use the Electronic Service Guide on their Mobile TV enabled phone as a remote control for their home TV.

4.2.2 Place and time shifting

Programmable hard disc recorders at home can already be remotely controlled from a mobile device while away from home for instance to record a TV program. This allows "time shifted" viewing. Sling Media's Slingbox™ and Sony's Location Free TV enables users to remotely watch TV by redirecting and streaming their home TV programs as well as recordings over the internet which facilitates place shifting. The trend towards mobile time-shifted media is also exemplified by podcasts.

Some IPTV providers offer a recording function in the network for home viewing. A further step for them is to enable users to watch their recorded TV programs on the mobile device via streaming or alternatively to have it pushed to the mobile for instance overnight for viewing on the move without the need for a network connection.



4.2.3 Mobile TV on other devices apart from mobile phones

Any portable consumer electronic device equipped with audio visual capabilities has the potential to serve as Mobile TV terminal. Examples for such devices are the in-car T-DMB receivers used in South Korea. Currently more than 40% of all T-DMB terminals fall in this category due to the strong local automotive industry, which began to utilize T-DMB early as a traffic information channel.

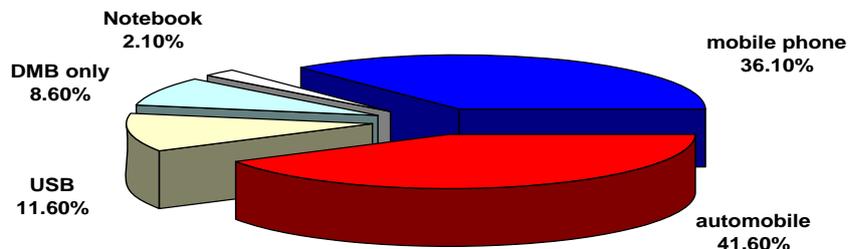


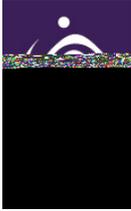
Figure 4.2.3: T-DMB Terminals used in Korea

Car navigation systems (GPS) combined with Mobile TV functionality is already offered. In cases where these devices are not connected to a cellular network they cannot benefit from interactive and on-demand services¹⁶.

4.2.4 Device memory

The average embedded memory capacity in mobile devices has increased more than ten times over the past 5 years while component cost remained constant. Affordable 2 –8 GB memory cards are a reality today; the price per GB is predicted to decrease by more than 90% over the period 2006 – 2010. 40% of today's new mobile devices have a memory card slot; affordable mobile storage will be an important catalyst for the pre-delivery of (video) content via cellular and / or datacasting via broadcasting or multicasting infrastructures, but also for "side loading" (e.g. PC synchronisation).

¹⁶ <http://www.discountfan.de/artikel/mai-2007/penny-lcd-tv-mit-dvb-t-sowie-navi-2113.php>



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4.3 Services

4.3.1 Live services

Live services consist of audiovisual content streamed through channels without user control i.e. linear or traditional television or FM radio. Many mobile devices offer a normal FM and/or digital radio receiver capability. Most mobile operators are already offering live TV and radio over 3G and EDGE. Live services such as web radio are already accessible on a mobile phone as well.

4.3.2 On demand services

On demand services consist of Multimedia content streamed or downloaded to the device at the request of the user. For streamed content the user can be offered control over playback (i.e. play, pause, stop, fast forward and rewind). Those services are mainly offered via a mobile portal accessible by the mobile device. Alternatively the user can use a web portal in which case the content is pushed to the mobile device. For downloaded content, dependent on the operator's and content provider's policies the user may playback or reuse the content.

4.3.3 Podcasts

The term "Podcast" is a concatenation of "pod" and "broadcast", while the term "pod" refers to the Apple iPod for which the first podcasting scripts were developed¹⁷. Podcasting services are a mainstream development on the internet.

Podcasting consist of the automatic download of multimedia files belonging to a particular feed the user subscribed to. Podcasting facilitates users to tailor and personalise their media consumption. Many broadcasters are currently offering their news items and popular programs through podcasting via their website. The BBC is for instance offering an extensive selection of their radio programs via podcasting for free¹⁸ while CNN offers free hourly and daily audio & video podcasts¹⁹. Although podcasting is currently an internet phenomenon, this type of service has already made its way to the mobile domain as well. Podcasts could also be side loaded from the PC to the user's mobile device.

4.3.4 Scheduled delivery

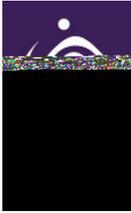
Applications and content can be delivered to mobile devices according to a particular schedule. Scheduled delivery is possible via cellular networks (i.e. 3G Unicast and 3GPP MBMS) as well as via broadcast networks (i.e. IP datacast).

KDDI of Japan pioneered the pre-delivery of rich media content with their "EZ channel" service which was commercially introduced in October 2003. The content was automatically pre-delivered to users during night hours or early morning via the cellular network. In September 2006 KDDI launched "EZ channel plus" based on 3GPP2 BCMCS multicasting (equivalent to 3GPP MBMS).

¹⁷ History of podcasting: <http://radio.weblogs.com/0001014/2003/10/12.html#a4604>

¹⁸ <http://www.bbc.co.uk/radio/podcasts/directory/>

¹⁹ <http://edition.cnn.com/services/podcasting/>



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4.3.5 Interactive services

Interactive services, in the context of Mobile TV, give the user the ability to interact with content and service providers. Examples are:

- voting
- quizzes in the context of game shows
- browsing side-information
- follow-up e-commerce services for advertising
- purchasing

People are used to the interactivity of the mobile phone. As mentioned above an Ericsson/NRK field trial has shown that interactivity doubled the Mobile TV viewing time. This can be seen as a strong advantage of the mobile phone versus the traditional home TV. In order to realize the benefits of interactive services, the following characteristics of the interactive mobile medium have to be considered:

- Users have to be *motivated* to engage with the interactive service, e.g. via incentives or a value proposition that clearly addresses real needs by personalizing the content provided
- Interactivity must not compromise the media consumption experience by placing demands on user attention, screen real estate, or response times.

4.3.6 Service guide

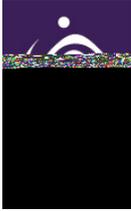
Service guides (commonly referred to as ESGs and EPGs) are “entry points” to the different services offered to the user. They allow users to navigate, select and discover content and services by channel, time, and title or programme format²⁰. The development of service guides is an area where individual service providers can successfully differentiate their service offering by offering multi-platform service guides that provide a list including both broadcast and unicast service elements.

Service guides are the primary point of contact and hence a key part of the provider-customer relationship. It should be personalised to deliver content according to the user needs and the characteristics of the terminal device. The Mobile TV application on the device allows branding and operator controlled advertising when rendering the service guide to the user. The Service Guide signals to the application the means to access the content (e.g. via Unicast and Broadcast) which allows for smooth integration of the services over various access types and technologies. Furthermore, the service guide enables integration with existing content offers, portals for on-demand, podcast and scheduled delivery services.

4.3.7 Summary

This chapter illustrates the currently emerging plethora of mobile audiovisual services. Mobile TV is not just about traditional linear TV on the go. New multimedia mobile services are becoming feasible as high-bandwidth HSPA networks are offering DSL-like user experience on the move. Furthermore storage capacity keeps

²⁰ Note that particularly in the context of mobile broadcast media the ESG also performs EPG (Electronic Program Guide) functions by providing users with overviews and access to current and programme events.



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increasing, as manifested by the availability of affordable 4 GB memory cards and devices with 8 GB on-board memory out of the box.

There is a clear general trend towards a more individualised consumption of audiovisual content; this is further catalysed by user generated content²¹. PVR equipment at home, missed program services as well as podcasts, offered by broadcasters via their websites, all lead to a time-shifted viewing & listening behaviour at home. Potentially new mobile push content services like datacasting and scheduled delivery and other delivery modes will further add to this trend. These factors will strongly influence mobile viewing and listening behaviours of consumers. Therefore, the term Mobile TV entails much more the real-time broadcast of multiple linear channels. Cost effective delivery of those services to the users will require a mixture of broadcast technologies especially for areas with high demands of concurrent collective viewing of linear content, combined with cellular technologies which facilitate individual viewing.

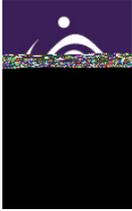
	Mode of delivery	Form of delivery	Typical carriers
Live services (digital radio & television)	Real-time	Streaming	Broadcasting MBMS (mobile) Unicast (mobile)
On demand services	Pull	Streaming/download Initiated by user	Unicast (mobile)
Podcasting	Pull	Download	Unicast (mobile) MBMS (mobile) and IP datacast ²²
Datacasting	Push	Carrousel system Selective storage	Idle broadcast capacity MBMS (mobile)
Scheduled delivery	Push	Scheduled by network	Unicast (mobile) MBMS (mobile) and IP datacast (off peak)

Table 4.3.7: Broad range of service delivery modes

Most likely, mobile operators will try to enrich the user experience offered on their mobile devices by integrating a broad range of service delivery modes and the services covered in this chapter.

²¹ YouTube generated more traffic during 2006 traffic than the entire internet in 2000

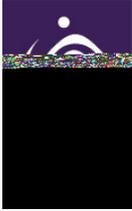
²² When popular content is downloaded by many users, Broadcast bearers can be used.



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These developments will gradually remove any limits to the access of favourite content with users getting accustomed to an increasing array of content access devices and reception modes. In addition, user demand for tailored and localized content will continue to grow. The compound impact of these developments could lead to a co-existence of a variety of complementary content consumption modes; making broadcast as a crucial component of mobile multimedia services. In addition Mobile TV broadcasting could also be considered for the delivery of content via datacast (carousel mode).



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5 Business model

5.1 Introduction

It is evident that Mobile TV cannot be implemented and operated by a single party. Hence cooperation between various stakeholders is necessary in order to sustain the high investments required for building the infrastructure, operating the service, providing the content and creating a bespoke customer experience. This chapter provides an overview of the various stakeholders involved as well as a framework illustrating the most likely interactions between market actors. Hybrid business models are described as well, since it is unlikely that only one technology suits the needs of an entire market.

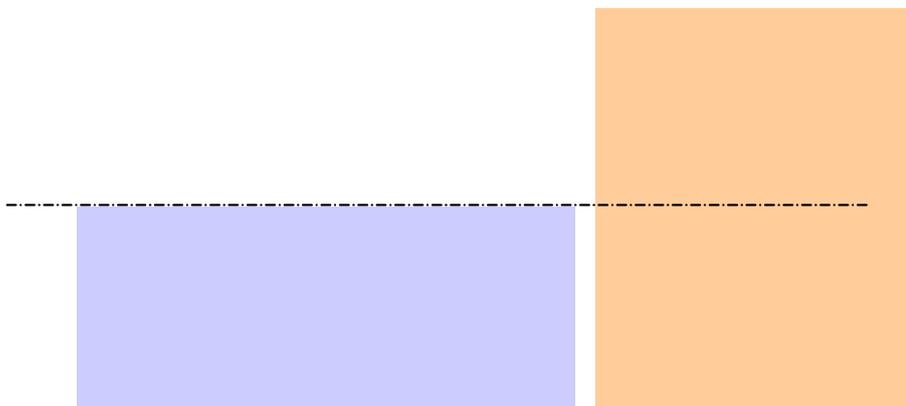
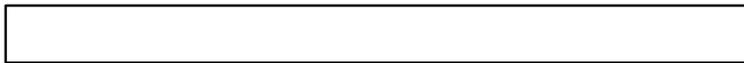
5.2 Stakeholders

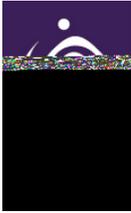
Regarding the business model for mobile television broadcast the following stakeholders could play a role in the emerging value chain. The role each could play is strongly dependent on the local regulatory regime.

- End-user – Ultimately decides what he likes, when he wants to enjoy viewing or listening and what and how much he wants to pay for or not.
- Broadcasters – Aggregating audiovisual content into “radio and TV stations” as known by the general public. They determine the station’s radio- and TV-program as appears in radio and TV listings in newspapers, in dedicated magazines as well as on the web. Commercial stations normally sell time slots during and in between programs to advertisers. Broadcasters normally operate based on a broadcasting license.
- Mobile Broadcast service operator or “mux operator” – Provides a mobile broadcast service on a wholesale basis. Normally holds a platform or mux license.
- Broadcast Network Operator (or “technical broadcaster”) – Operates the mobile broadcast infrastructure based on a radio frequency license. The frequency licensee could outsource the operation of the infrastructure to a third party.
- Content aggregator is an entity that bundles multimedia content for distribution. The mobile network operator could act as content aggregator.
- Program Aggregator is an entity that bundles a number of public/commercial TV channels with value added services embedded in best-suited EPGs. Mobile network operators could act as program aggregators as well.
- Mobile Network Operator – Operates a mobile cellular network providing mobile services to end-users. In many markets mobile handsets are being subsidised by mobile network operators. Handset subsidy is recouped from future end-user revenues.
- Handset vendors – Produce mobile handsets capable of receiving radio and television broadcasts. Their role differs per market.
- Network vendors produce network equipment and software to be used as building blocks within the mobile TV eco-system.



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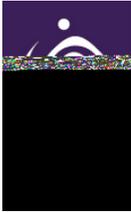


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Some of the main interfaces in figure 5.3 could be described as follows:

- In countries where several distinct market actors are cooperating within the Mobile TV broadcast domain there is a commercial relation between each of the broadcast infrastructure operators and the mux operator (see also figure 5.3). The broadcast operator provides radio coverage with agreed minimum field strength within defined geographic areas with a guaranteed service availability of at least 99.9x% of time. The mux operator essentially rents a radio service from one or more broadcast infrastructure operators who together ensure ubiquitous and coherent radio coverage in a given geographic area.
- The mux operator sells TV channel capacity for agreed time periods to public and commercial broadcasters as well as capacity for their exclusive TV channels to Mobile Broadcast Operators. Idle TV channel capacity could be sold to MNOs for datacasting services.
- In cases where public broadcasters are state financed and bound not to generate any additional revenues a must-carry principle could be part of the license of the mux and broadcast infrastructure actors.
- Commercial TV broadcasters pay the mux operator to be available for mobile viewing as they clearly extend their so-called reach. Similarly Mobile Network Operators who wish to differentiate themselves versus their competitors could rent one or more TV channels for exclusive viewing by their customers.
- Broadcasters and mobile network operators will have a contractual relationship to cover financial and service aspects as well as content right issues. Contracts between commercial broadcasters and Mobile Network Operators could cover a wide range of issues, for instance how to deal with the not insignificant delta costs for the Mobile TV capability of handsets which could be (partially) hidden for end-users by increasing the handset subsidy; this would allow a faster uptake of the Mobile TV service. As the coverage of TV broadcast infrastructure in most cases will only be available in urban areas, mobile network operators will normally extend the geographic coverage via unicast and in due course MBMS to mitigate capacity problems in the mobile network. As this clearly represents a value for the broadcasters this aspect should be covered in the contractual relation as well.
- Although still in a nascent state, in due course broadcasters and mobile operators could attract third party revenue streams from advertising. Agreements are needed on the allocation of those fees. It should be noted that mobile network operators will provide reporting and facilitate the interactivity for advertisements.



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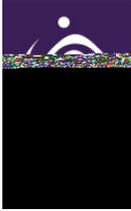


5.4 Hybrid business models

The generic business model above leads to specific deployment strategies. Some potential stages of deployment are described below. The first and the third bullets involve only the mobile operator domain within the business model in the previous chapter, whereas the other three bullets cover the whole business.

- **Unicast only** – Many mobile network operators offer streamed Mobile TV services via unicast using existing mobile network infrastructures. The service is either provided by a mobile network operator or by a service provider (e.g. MobiTV in France). In Unicast, each active user of the service utilizes a dedicated radio resource. Therefore, as the number of subscribers increases, more capacity will be required. As capacity is limited, this could lead to a shortage of network resources in the future. In order to overcome capacity issues additional infrastructure investment will be needed such as additional sites and radio resources; furthermore higher quality video implies extra capacity will be needed due to higher bitrates. In this model the content has to be purchased by the MNO. The content costs are a significant part of the total cost and thus driving the profitability of the services. Revenue sharing between MNO and content owners is a way to share risk.
- **Unicast & terrestrial broadcast** – This model adds broadcast- and mux operators into the picture for additional reach of broadcast services. Besides the MNO infrastructure for the unicast model an additional broadcast infrastructure is essential. Radio resources in the broadcast infrastructure are shared by multiple Mobile TV users. The most popular channels judged by numbers of users watching these channels are put on the broadcast infrastructure while the long tail is delivered via unicast. This combined mode is expected to be the first implemented in some markets.
- **Unicast & MBMS**²⁵ – As for the pure unicast model only an MNO infrastructure is required for a hybrid unicast & multicast model. Essentially the same business model applies, except that radio resources are shared by multiple Mobile TV users. By putting the most popular channels in a geographic area over MBMS, the number of users watching these channels can increase without constraints on the radio resources. MBMS is deployed over existing 3G infrastructures and spectrum as a network upgrade. It is expected that terminals supporting MBMS will be available in 2008.
- **Unicast + MBMS + terrestrial broadcast** – This model adds broadcast and mux operators into the picture, making business relationships slightly more complex. It requires investment in a broadcast infrastructure to allow for unlimited number of users using TV channels within geographic areas covered in accordance with license obligations. This investment can be shared among players. In areas and/or locations (e.g. indoor) without coverage of the terrestrial broadcast infrastructure the service could be offered via unicast or multicast. A limited set of terminals supports this

²⁵ The 3GPP2 equivalent BCMCS is considered here as the CDMA-2000 equivalent to MBMS
Version 1.0



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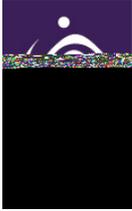


model; the portfolio is expected to grow. However it is also possible that a MUX operator (and broadcast Infrastructure operator(s)) and the TV channels (broadcaster) team-up to offer a service independent from MNOs. This is possible for non-connected devices (mobile phones); a retail arrangement with a MNO is needed.

- Unicast + terrestrial broadcast + satellite broadcast** – This is a multi party model which adds a Satellite Operator or Consortium to the picture, making business relationships more complex. The Satellite Operator requires investment in a satellite transponder, earth stations and potentially terrestrial repeaters. Such investment has typically a long term return as satellite lifetime is 15years+. This option could be considered by countries with extensive rural areas where satellite distribution is expected to be cost effective. A terrestrial and satellite broadcast business model could work side by side when both are using the same technology and hence complement the services for the end-user.

The added values and cost elements of above hybrid business models are summarised in the table below. It should be noted that radio spectrum needs to be assigned for the second, fourth and fifth cases, whereas the first and the third cases make use of 3G spectrum. In Europe in particular the licensing process for Mobile TV is not clear. Finally it should be noted that the level of complexity of the business model increases for the last two cases as more market actors are involved.

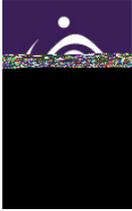
Business model	added value	cost elements
Unicast	reference for the following cases (it exists today)	Mobile Network elements e.g. backbone, additional radio capacity and new sites (densification for capacity)
Unicast + terrestrial broadcast	relieves the MNO network load by means of overlay architecture	Mobile Network and Broadcast network elements e.g. new infrastructure (potentially leveraging existing terrestrial TV assets)
Unicast + MBMS	mitigates MNO network capacity constraints due to optimising the use of network resources	Mobile Network elements (SW upgrade) and a BM-SC (Broadcast Multicast Service Centre) e.g. network upgrades including: new software, hardware dedicated auxiliary, MBMS entities, and new sites.
Unicast + MBMS+ terrestrial broadcast	relieves the MNO network load by means of overlay architecture especially in cities and hotspots	Mobile Network and Broadcast network. BM-SC (Broadcast Multicast Service Centre) added to the Mobile network as well as a complete new broadcast infrastructure



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Unicast + terrestrial broadcast +		(potentially leveraging existing terrestrial TV assets)
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6 Business case

6.1 Introduction

This chapter identifies elements for typical broadcast and mobile operator financial business cases for the generic business model described in the previous chapter. The definition of “business case” in this context is the sum of revenues minus the sum of costs over a defined planning period of usually 5 –10 years resulting in a gross operating margin or cash flow statement. The assumption is made that Mobile TV service providers will be allowed to charge for the service and that content can be protected. This might be subject to regulation.

6.2 Revenues

Potential revenues depend entirely on the willingness of customers to pay for the service. It should be noted that service providers may intend to bundle the live TV service with other video services as indicated before. In that case only a part of the monthly revenues would be allocated to the Mobile TV broadcast business case. Revenues generated by interactive TV services could be shared between stakeholders involved.

It should be noted that revenues from non-broadcasted channels (e.g. delivered via unicast or multicast) do belong to the mobile network operator. On the other hand when video services are based on datacasting via the Mobile TV broadcast infrastructure, this could be considered to be part of the TV broadcast business case as well.

Careful trade-offs are necessary to set end-user tariffs based on price elasticity of users which could be assessed through market research. When the service is charged too low, the service could become loss making. Average overall monthly TV and video revenues per active user are in the order of 3 – 8 euros per month of which only part could be allocated to the business case for Mobile TV broadcast. Premium content costs could be recouped by charging the customer a premium fee on top of the monthly charge.

As Mobile TV will give an extended reach to current TV services various stakeholders may consider financing this new medium. Once the Mobile TV audience has grown beyond a critical mass, advertising revenues will become significant as well. The new medium will allow for personalized advertising. Customer management information typically available at mobile network operator could be of high value for broadcasters and content providers.

6.3 Costs

It is assumed that the Mobile TV broadcast infrastructure is built and operated by one or more separate companies who provide their service to a mux operator for a rental fee the height of which depends on the geographic area or percentage of population covered. This could furthermore depend on the level of indoor coverage.



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The broadcast infrastructure requires significant investments for which the payback period could be more than 5 years (which is a typical figure for mobile infrastructures as well). Furthermore the broadcast infrastructure operator will need licenses, which could imply costs as well.

The mux operator in turn sells channel capacity to TV channels as well as to mobile operators typically for an annual fee. The fee typically depends on the capacity rented, e.g. number of channels, bit rate per channel (i.e. quality) and time per channel.

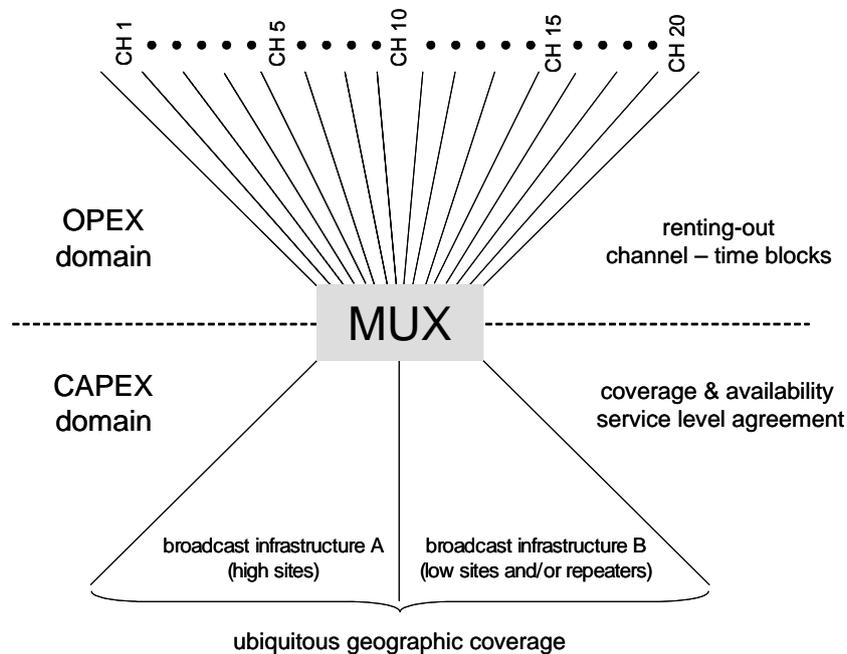
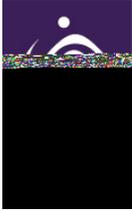


Figure 6.3: Broadcast infrastructure(s), mux operator and TV channels relationship

In combination with the right TV content, value added and interactive services as well as suitable handsets, program aggregators play an important role. It must be possible for them to choose and select the appropriate program bouquet for their users. Most likely, mobile network operators will act as the program aggregators offering attractive bouquets of services which are enriched with interactive features and value added services embedded in best suited EPGs. The right service offerings in combination with marketing and a best-in-class handset portfolio will attract users towards Mobile TV and make them pay for such a service.

Since MNOs are also in charge of the handset portfolio for Mobile TV services, handsets will mainly be subsidised and offered within a service package. Furthermore, MNOs are well positioned to offer interactive services or support Mobile TV even in unicast (e.g. long tail as well as extended coverage outside the broadcast infrastructure footprint).



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Typical technical costs within the mobile operator domain are the following:

- service development such as EPG/ESG, device enhancements, etc
- billing and customer management
- additional device costs for the added Mobile TV broadcast capability²⁶
- securing access and/or content such as SIM enhancements, encryption, etc
- enabling value added and interactive services

Other operational costs a mobile operator is facing are:

- handset subsidies compensating additional device costs
- broadcast service rental fees for exclusive channels (to mux operator)
- content rights
- marketing & advertising costs

6.4 Spectrum Cost

It is impossible to offer services to mobile users without having access to radio spectrum, which is a scarce natural resource. The scarcity of spectrum compared to growing demand will inevitably lead to a different approach for the allocation of spectrum. Such an approach should allow for fair competition between all actors which should lead to a more efficient and effective use of spectrum. Therefore, the following should be considered very carefully:

-



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6.5 Order of magnitude financial market assessment

It would not be appropriate to include a financial analysis for one particular country in this whitepaper. As an alternative a high level assessment is provided for the three major stakeholders in the “value web” as identified in the previous chapter in a hypothetical country: the broadcast infrastructure provider, the TV channels and the mobile network operators.

The hypothetical country could be regarded as an average case study for the European Union. In terms of geographic size it is 1/43 of the total land mass and 1/41 of the total population of the EU-27 countries combined with 120 inhabitants/km². Our hypothetical country has the following characteristics:

- area: 100.000 km²
- population: 12 million
- living areas: 30

The mobile market is structured as follows (applying for all mobile operators):

- mobile penetration: 95% (people with more than one SIM are counted as one)
- 4 mobile operators with 40%, 25%, 17,5% and 17.5% market share
- for reasons of simplicity this situation is considered to remain stable during the 10 year period considered for the model
- 40% of mobile devices are renewed every year

The Mobile TV broadcast infrastructure

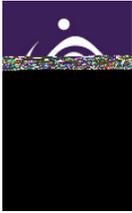
- is available to 2/3 of the population; living in 1/3 of the total area
- offers 16 channels of 400 kbps each
- all MNO's offer the 8 common channels
- the mobile operators offer respectively 4, 2, 1 and 1 exclusive channels

It is assumed all market actors apply the same financial criteria

- interest: 10%
- inflation: 3%
- latter two leading to a discount rate of 13.3%

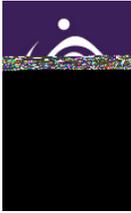
The broadcast infrastructure operator applies to following annual charges

- to mobile operators:
 - 2 million Euro for the 8 common channels consisting of 4 public and 4 commercial TV channels
 - 0.75 million Euro for an exclusive channel
 - 10 Euro per active user per year (i.e. revenue share)
- it is obligatory to broadcast the four public TV channels free of charge
- the four commercial TV stations are each charged 1.5 million Euro



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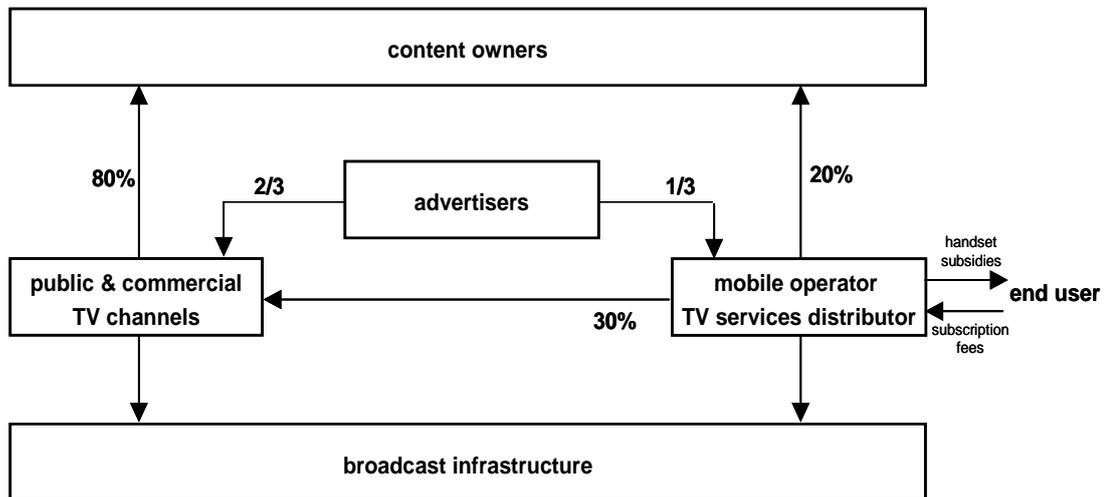


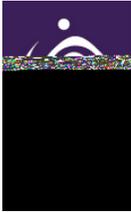
Figure 6.5.2: Mobile operator business case characteristics

For modelling purposes the business model is simplified as illustrated above. The following principles apply:

- public TV channels do not pay for broadcast infrastructure (i.e. must carry principle)
- commercial TV channels pay the broadcast infrastructure provider for extending their reach
- mobile operators pay the broadcast infrastructure provider for exclusive channels
- content rights are paid 50/50 by TV channels and MNOs, while MNOs only pay 40% of their share directly to content owners and the rest via TV channels
- 2/3 of advertising revenues are allocated to TV channels and 1/3 to MNOs
- Advertising revenues grow with the number of active TV broadcast subscribers in the whole market – with 1.5 million active subscribers advertising revenues pay 100% of content costs.

Table 6.5.2: The modelling results in the following pay-back periods

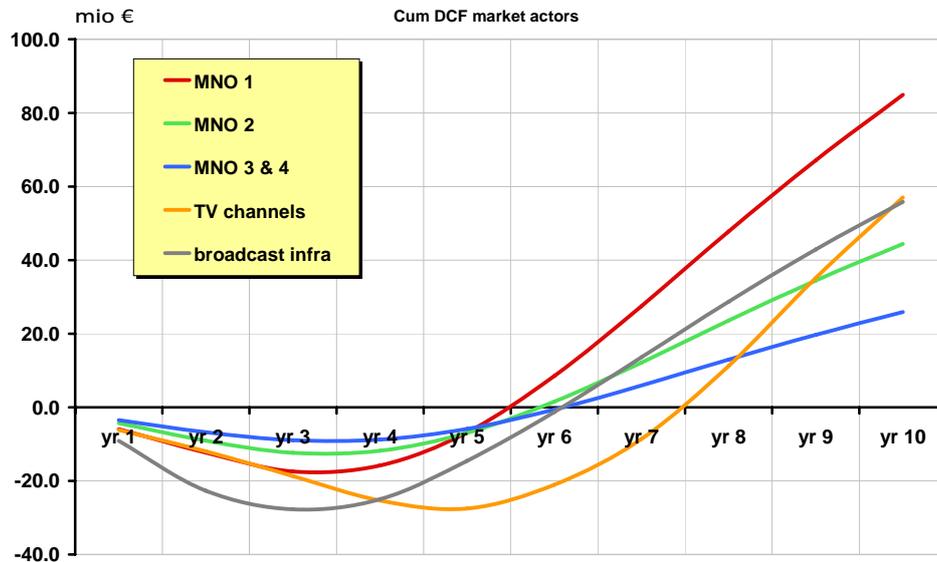
	Operating Margin	DCF
Broadcast infra	positive from start	5 years & 2 months
TV channels	4 years & 3 months	6 years & 6 months
MNO 1	2 years & 9 months	4 years & 6 months
MNO 2	2 years & 10 months	4 years & 10 months
MNO 3 & 4	2 years & 10 months	5 years & 2 months



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Peak funding for the various market actors is illustrated in the graph below.



Peak funding and payback period based on cumulative discounted cash flows

Figure 6.5.3: Peak funding for the various market actors

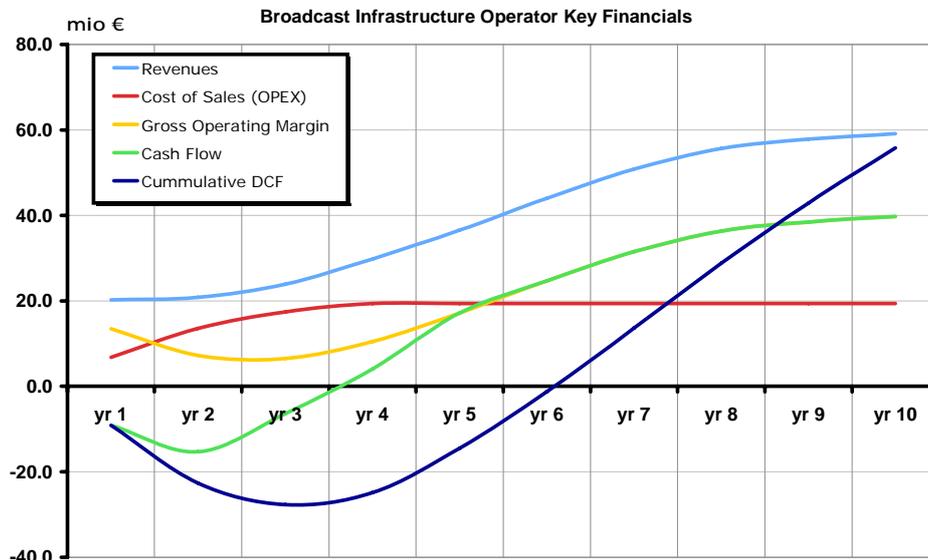
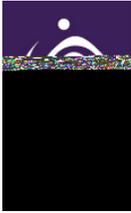


Figure 6.5.4 :Financial performance of broadcast infrastructure provider

From this business modelling exercise it can be concluded that all market actors will need to regard Mobile TV as an investment opportunity turning into a positive



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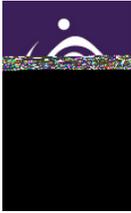
operating margin in 3 – 4 years. The main reasons for this relative long payback period are:

- the broadcast infrastructure provider faces an investment of 65 million Euro and an operational cost of nearly 20 million per year
- the rollout of the broadcast infrastructure is assumed to take place during the initial 4 years with an investment profile of 35% of total CAPEX in the first two years, 20% in the third year and 10% in the fourth year. It is assumed that coverage is directly proportional to cumulative CAPEX spent. After 4 years 66.6% population is able to receive Mobile TV broadcast. This percentage doesn't change in later years.
- The broadcast infrastructure provider is looking for a positive free cash flow over a few years which it could only achieve by charging appropriate wholesale tariffs to MNOs and commercial TV stations in the order of 3 – 5 million Euros per year for MNOs and 1.5 million Euros for broadcaster per TV channel as of the first year of operation.
- MNOs are facing extra device costs that they only can partly recoup from their customers; this drops from 50 Euro initially to around 5 Euro during the second half of the period.
- Content costs are recouped through advertising which only materialises when an audience of sufficient size has been established to be of interest to advertisers.

The case is quite sensitive:

- Doubling content costs from 1 to 2€/month implies an increase of the MNO payback (DCF) of 1 year.
- MNOs not cross charging 50% of the incremental device costs to the users have a similar effect.
- In case the smallest MNO wouldn't launch mobile broadcast TV it would increase the broadcast infrastructure payback (DCF) by 2 years.

The cost structure for the various actors is illustrated below.



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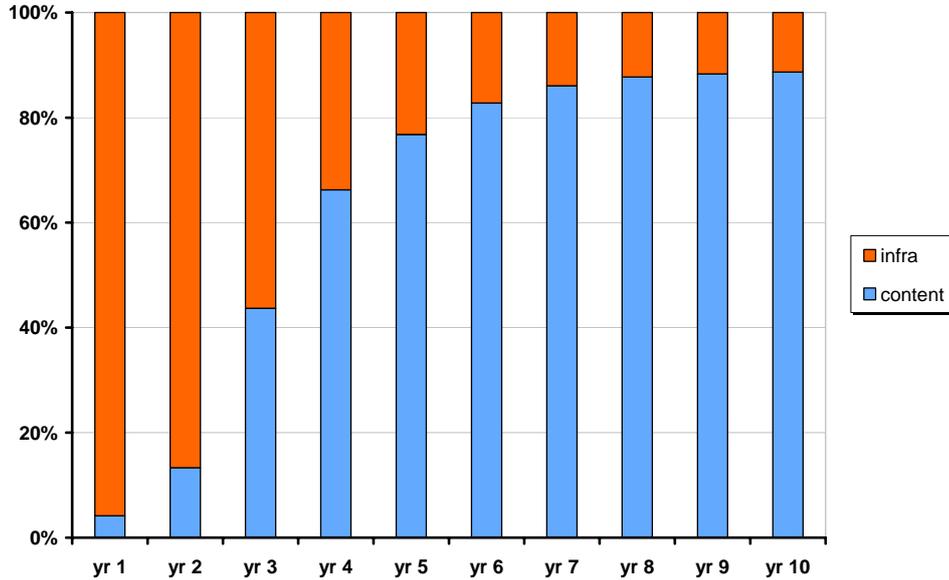


Figure 6.5.5: Cost structure TV channels

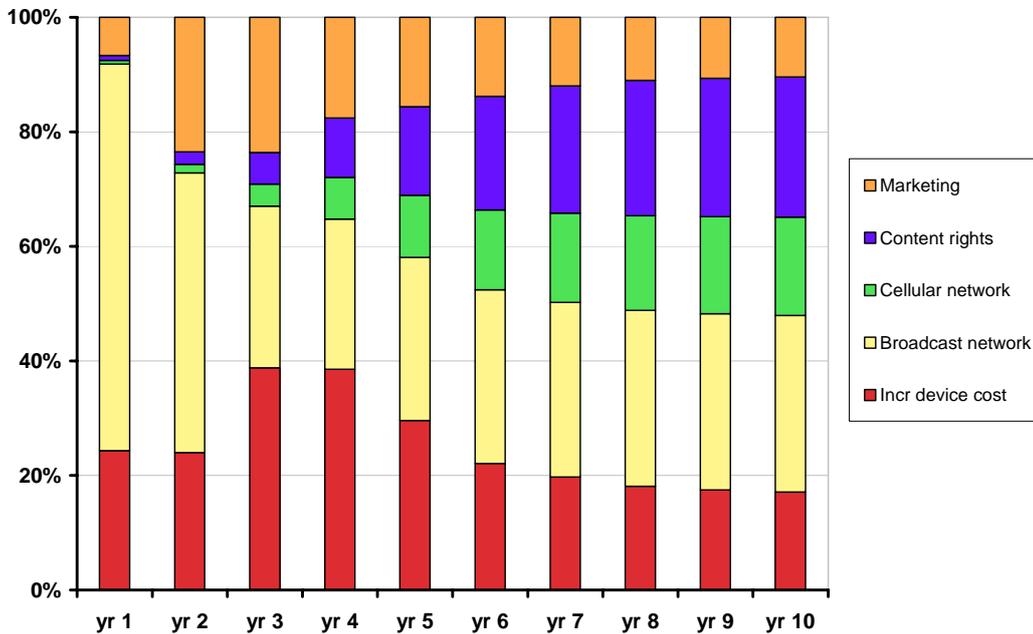
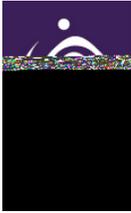


Figure 6.5.6: Cost structure MNO 1

7 Country review

There is a widely held view that video streaming Mobile TV generates substantial traffic and existing 3G networks have limited capacity to support such traffic. The



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user patterns have been described in section 2 of this document. As a result many trials have been conducted with broadcasting technologies which apparently will be essential to support the full range of Mobile TV and video on demand usage scenarios.

A number of the country deployments have been attached as an ANNEX to this document. Some countries offer a commercial service already while others are still in the process of doing so. Analysys argues that there are disadvantages for mobile operators in deploying broadcasting technologies. These include lack of available and licensed spectrum; the significant cost of building a new network and a potential loss of control over Mobile TV services to broadcasting companies.

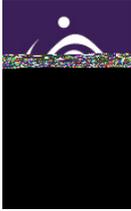
Today's Mobile TV situation in selected countries

	Services	Access
Austria	Live streaming, VoD	2G/3G
Finland		2G/3G, DVB-H
France	Live stream VoD	2G/3G
Germany	Live streaming, VoD	2G/3G, T-DMB
Italy	Live streaming, VoD	3G, DVB-H
Japan		3G, EV-DO, ISDB-T 1seg
South Korea		3G, EV-DO, S-DMB, T-DMB
Spain		2G/3G
Switzerland		2G/3G
UK		2G/3G, DAB-IP has been discontinued.
USA		2G/3G, EV-DO, FLO, DVB-H has been discontinued.

Table 7.0: Current Mobile TV access technologies

As of today the Mobile TV outlook with respect to mobile broadcast environment in 2008 – 2012 can be briefly described in the Table below. There will always be 3G streaming, so it is not listed in the table for simplicity reasons. In several countries operators will consider MBMS on top of 3G.

	business model	Service model
Austria	Consortium of broadcast and mobile operators	most likely basic and premium packages
Finland	Wholesale	Launched end 2006 Monthly charge
France	Wholesale as likely model	T.b.d
Germany	Platform operator with media licence, BNO with frequency licence	T.b.d. Current T-DMB service is offered for a monthly charge
Italy	Mobile operator (Three) Wholesale (TIM & Vodafone)	Monthly charge
Japan	Embedded in Broadcast infrastructure	Free



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	Broadcaster Mobile Operator (SKT)	Free (T-DMB) Monthly charge (S-DMB)
South Korea		
Spain	T.b.d	T.b.d
Switzerland	licence awarded to BNO	T.b.d
UK	most probable consortium	T.b.d.
USA	Wholesale	Verizon VCAST Mobile TV \$13, \$15 and €25/mth AT&T to launch early 2008

Table 7.1: Expected Outlook for 2008-2012

8 Spectrum allocations for Mobile TV broadcast

8.1 Introduction

At present Mobile TV broadcast services are operational in Asia, US and in some European countries. Today's systems are subject to national regulation as no global Mobile TV spectrum broadcast allocation exists. This chapter reviews the current spectrum situation in relevant markets and highlights important issues to be addressed.

8.2 Japan

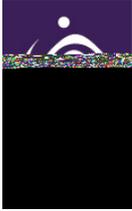
The current free to air Japanese Mobile TV broadcast service (i.e. "1seg") is a tightly integrated part of the current digital ISDB-T infrastructure in Japan.

The regulator MIC has announced a policy to allocate 35 MHz to broadcast applications out of the 130 MHz which will become available after the complete termination of analogue TV broadcast in Japan now targeted for July 2011. Part of the 35 MHz is expected to become available for mobile multimedia broadcast using a broader bandwidth than 1seg is using today. MediaFLO and ISDB-Tmm, amongst others, are candidate technologies.

8.3 South Korea

Two VHF channels (180 - 186 MHz and 204 - 210 MHz) are allocated to six TV broadcasters offering free of charge T-DMB services. A total of 7 high quality video, 13 audio and 8 data channels are broadcasted since November 2005. The infrastructure consists of a combination of very high broadcast towers and many repeater stations for instance covering the entire Seoul metro network with 287 km of tracks, 263 stations with more than 5.5 million commuters per day.

The TU-Media satellite operates in the 2,630 – 2,655 MHz band and broadcasts directly to the mobile users offering 20 TV channels and 20 radio/audio channels. The satellite uplink operates in the 13,824 – 13,883 MHz band. In order to improve mobile reception more than 10,000 terrestrial repeaters are deployed. The band 12,214 – 12,239 MHz is used for the satellite feed for the terrestrial repeater stations re-broadcasting the signal in the 2.6 GHz band.



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8.4 USA

In the USA the distribution of TV via satellite and cable is well above 90% of households. 17 February 2009 has been set as the total and firm date for switch-off analogue TV.²⁷ During the 2001/2003 spectrum auctions Qualcomm acquired a 6 MHz nationwide single frequency allocation (channel 55, 716-722 MHz) within the lower 700 MHz band that is currently being used for MediaFLO offering mobile TV broadcast services on a wholesale basis to Verizon and AT&T. The service is today offered in more than 50 cities in 24 states.

In April 2006, a second possible DVB-H entrant was announced by Hiwire, a subsidiary of the Aloha partners, who acquired 700 MHz spectrum during the 2001/2003 auctions. Meanwhile Aloha acquired Cavalier Group LLC and DataCom Wireless LLC, two other 700 MHz spectrum owners, and subsequently it claimed spectrum in 244 licensed markets that cover 175 million population, or about 60% of the total US population. The company's spectrum holdings are in TV channels 54 and 59. However early October 2007 it was reported that Aloha sold this spectrum to AT&T. AT&T has not yet announced its intention but would be allowed to deploy Mobile TV platform based on the technology of their choice (including over 3G/4G networks).

Mid 2007 Crown Castle closed its *Modeo* subsidiary, a DVB-H-based network operator in the 1670 MHz band (L Band), which failed to sign wholesale partnerships with cellular carriers.

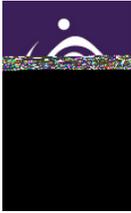
It was also around Mid 2007 ICO (Next Generation Mobile Satellite Service Operator in the US) announced to start Mobile TV service trials in 2,2 GHz band with DVB-SH technology. A satellite will be launched in 1Q08, and will be complemented by terrestrial network.

8.5 Europe

The rollout of a pan-European Mobile TV service is at risk due to the lack of harmonised spectrum. As there is a demand for this kind of services, mobile operators offer TV services via unicast (i.e. streaming) through their networks. Current Mobile TV broadcast implementations and trials within Europe are based upon broadcast allocations and on national regulation. It should be reminded that the spectacular success of the European industry with GSM was strongly catalysed by the Europe-wide harmonisation of 2 x 25 MHz ten years before the first GSM-900 networks were rolled out.

In Europe, the UHF spectrum (470-862 MHz) is allocated for broadcasting and also other terrestrial services to date, it has been used widely for analogue TV in many countries and most countries have launched digital TV while some have already shut-down their analogue operations leaving part of the UHF unused. Within UHF

²⁷ Legislation passed Congress February 2006



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band, many European countries already introduced DVB-T, and other countries are planning to launch DVB-T in 2008. A number of countries, where DVB-T is yet to start, are considering or have already decided to use MPEG-4 with DVB-T. However countries that have already introduced DVB-T may need temporarily to use additional layers for introducing MPEG-4 as well as to facilitate an associated transition period. DVB-H services were launched in some countries in 2006 or planned for 2008 and onwards. They follow a scattered spectrum approach as per GE06.

Moreover, like South Korea, a satellite-based alternative could also be considered. The 2170-2200 MHz band is suitable to provide satellite coverage for urban and rural areas. Moreover at ITU level, this band is allocated on co-primary basis to both Mobile Satellite Services (MSS) and Mobile Services (MS). This band is currently available on a global scale and free from any usage in Europe. However, Europe wide MSS band assignment process could be expected in mid 2008 depending on the output of ongoing discussions ongoing within the European Commission and the Member States. A new DVB-standard for using this frequency band in a hybrid satellite/ terrestrial mode was agreed and adopted by ETSI mid 2007.i.e. DVB-SH. In principle this new standard works in all other frequency bands up to 3 GHz as well, including L bands, 3G bands and UHF bands. This will however, require National Regulators to adopt this broadcasting service in the mobile assigned bands.

The UMTS Forum Mobile TV group has submitted recommendations to the European Commission to address the issue identified in this paragraph²⁸.

8.6 China

Chinese government has not formally allocated any spectrum for Mobile TV use yet. It has been announced that the band of 2635 to 2660 MHz (satellite usage) will be assigned to CMMB standard (also known as STiMi) which was supposed to be the released industry standard by SARFT. However, SARFT CMMB trials for the Olympic Games project are in the UHF and L band.

Another standard T-MMB supported by China MII is currently under study with respect to coexistence with TD-SCDMA, and will use TD-SCDMA spectrum. However, T-MMB physical level is the same as that of DAB. Hence, the use of DAB band is also possible.

As a result, Mobile TV spectrum in China is not clear today as long as there is no clear path forward in the standard to be deployed. During the Beijing Olympics, T-DMB and other technologies (Total of 4 technologies including the 3 national candidate standard technologies), will be used within UHF as well as L bands in different cities. The National technologies can be seen as trials.

²⁸ UMTS Forum recommendations to the European Commission for the deployment of mobile TV within the EU – dated 30 March 2007



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9 Content Rights & Regulation

9.1 Introduction

In July 2007, the European Commission announced its preferred choice of standard in Europe. 19 EC countries fully support the EC's goal for mobile and interactive TV but do not support early decisions on Mobile TV standards and believe markets and prices will decide. This is due to the fact that in a number of the countries have no clear plan for assigning the spectrum and the time frame for licensing process which in some cases means changing legislation to make this happen.

The successful deployment and take up of Mobile TV will crucially depend on content availability. It has to be recalled that the transmission of audiovisual content and the content itself fall under two separate sets of rules at EU level: e-Communications policy and content policy. The present document relates to the e-Communications aspects of standards, spectrum and authorisations. This does not mean that there will not be a need to present new initiatives in the areas of mobile TV content and in due course.

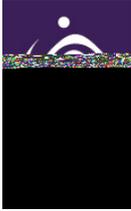
The proposed new directive on audiovisual media services is expected to create a modernised framework also for Mobile TV content, whether broadcast or provided on-demand.

There is still uncertainty as to what impact the new Audiovisual Media Services (AMS) Directive, will have on Mobile TV and UGC until it gets adopted and implemented into national law especially, the classification of linear and nonlinear services with respect to the rights and obligations they will impose on the development of the Mobile TV market. Besides, as partnerships between operators, broadcasters, manufacturers, and media and Internet companies are most crucial for the success of this business it is unclear how content should be regulated over so many different distribution channels.

Problems of promoting the portability of content in the EU are strongly highlighted by Mobile TV. A key challenge will be to offer valuable, premium Mobile TV content on a flexible basis that transcends platforms and borders. Copyright and related issues, to extend existing rights to allow the enjoyment of Mobile TV anytime anywhere and on any device would require a new approach to the "territorialisation" of rights, perhaps through pan-European rights licensing. However, these issues, while more acute for mobile services, are not restricted to Mobile TV, and should be tackled in the more general approach to IPR in the European Information Space.

In the majority of Member States there is no specific regulatory framework for Mobile TV. In some others, existing regulations are interpreted and applied to Mobile TV. In a number of countries the technologies for mobile broadcasting fall under the broadcasting regulatory framework.²⁹ In several Member States where existing media legislation does not contain specific provisions on Mobile TV, discussions are ongoing and some modifications to existing legislation are foreseen. So far, there is

²⁹ M-TV on 3G networks is generally covered by existing 3G licenses.



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little experience with broadcasting services using exclusively mobile transmission (i.e. not having a terrestrial, cable or satellite programme licensed under media law).

Whilst it is clear that the licensing decision remains a national prerogative, industry also expects a clarification of the prevailing licensing framework and seeks to obtain a reasonable level of certainty on the matter, especially in view of launching services with coverage wider than a single Member State. In the future, such a cross-border and even pan-European dimension of Mobile TV services may gain importance. Licensing regimes must make sense in terms of the internal market that will govern the deployment of Mobile TV infrastructures, and the aim should be to strive for a level playing field allowing the various actors to compete on similar conditions. Some degree of consistency in regulatory approaches across the EU is needed in order to clarify applicable regulation and create a regulatory environment conducive to investment and innovation. Traditional broadcast obligations (e.g. must carry) should not be automatically applied to new services.

One should not underestimate the importance of DRM to the effective development of new content markets in general and mobile content in particular. DRM used by Broadcasters might not be the same as those used by MNOs or even Content providers. Yet, the music world is setting an example of how business can flourish without DRM. The question here is secure rights across the whole chain of delivery. If the operators cannot ensure owners rights (and revenues) are protected, the content producers will be reluctant to work with the MNOs.

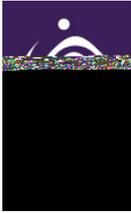
Delivery of a basic bouquet of channels that, as a minimum, matches customer expectations in the market is another important item. Users will only be willing to pay for Mobile TV services if the content is worth more to them than what they receive on linear TV.

Securing rights to premium content especially to Sports or Events needs to be more flexible and the rights to distribute this over a chain of distribution networks negotiated and secured by all MNOs offering the service.

The same applies for Securing rights to premium TV series and movie libraries that users would like to watch regardless of where they are on their mobile phone.

Furthermore, Mobile TV business models often require more roles than foreseen in traditional legislation. To keep technology neutrality Mobile TV business models have to be treated in analogy to others, especially Cable TV services. For example, the Austrian Private TV law enables service providers who forward broadcast content simultaneously, unaltered and unbridged via cable or microwave systems (satellites), to be entitled to facilitate IPR acquisition.

Existing advertising regulations may not be adequate for Mobile TV business models. For example, current regulations on length and number of Between Program Breaks may not be suitable for Mobile TV usage patterns.



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9.2 Content Distribution Models

Audiovisual Content is distributed to their audience according to the following three different modes:

- Free-To-Air
- Free-To-View
- Premium-Content

The Free-To-Air (FTA) model means that content is not encrypted and accessible to all viewers who own a suitable receiver without any access fee³⁰.

In the Free-to-View (FTV) model free access gives authorization to display an encrypted content to all valid subscribers of the operator without any explicit rights conditions. Customer pay for infrastructure access, but in general there is no additional fee for content rights. Providers also might apply geographical restrictions to distribution.

In the Premium-Content (or Pay-TV) model either PPV (Pay-per-View), PPT (Pay-per-Time), VoD (Video-on-Demand), or nVoD (near-Video-on-Demand) is used. PPV means that a single event or event package is accessed and paid for by the consumer. PPT grants the right to access certain content for a given period of time. VoD is similar to PPV in that the chosen content is made available and paid upon request of the consumer, but he/she can choose the starting time. nVoD is almost identical to VoD with the exception that available content is cyclically broadcasted for example every 15 minutes, thus leaving the consumer the option to choose from certain predefined starting times.

The following table summarizes what users should find to be free and what is not in different broadcasting models:

	Free-to-Air	Free-to-View	Premium-Content
Content	Free	Free	To Pay
Access	Free	To Pay	To Pay
Encryption	None	Yes	Yes

Table 9.2: Content Distribution Models

It is important to recognize that the dominant distribution model (FTA, FTV, and Premium) substantially varies among countries due to cultural and historical reasons. This strongly affects the approaches for business modelling and marketing new audiovisual services and programs. To enable a successful introduction, audiovisual offers need a balanced mix between freely accessible and pay-for components, with FTV together with Premium-Content as preferred combination: In many markets FTV drives service adoption by offering customers an affordable, broad content selection in exchange for a modest access fee. This is required to achieve the

³⁰ Note: in some countries (e.g. Germany, Austria) there is an obligatory basic fee for using broadcast-enabled devices (TV, Radio, Multimedia-PC).



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critical mass of service-enabled handsets. On the other hand, Premium-Content enables individualized, targeted offers. Only such combined offers guarantee sustainable investment by infrastructure and service providers.

In some countries (e.g. Germany, Austria) there is an obligatory basic fee for using broadcast-enabled devices in addition to a fee for the program delivered by national public broadcasters (TV, Radio, Multimedia-PC). In Austria Free-to-Air as described in this chapter is defined as “Clear to Air”, while Free-to-View is defined as Free-to-Air.

9.3 Cross border content usage

Language differences and program familiarity mean that subscribers will presumably want to see TV shows native to their country and language rather than other programs available in the country visited. However, one of the potential barriers to successful Mobile TV roaming scenarios is content rights. Many content rights are only acquired for national or regional use by the service provider. In order to prevent users located out of a defined geographic area to access such content, dedicated encryption and provisioning techniques (e.g. geo-targeting) are employed. For example, some broadcasting companies encrypt their channels when transmitted via satellite (Free-To-View), while they broadcast Free-To-Air terrestrially. The same issue arises when it comes to accessing content from outside the home network via Mobile TV clients. In this case, different national encryption systems would add additional barriers for users. In the case of unicast this out-of-country content restriction could be applicable as well in order to adhere to the content license obligations.

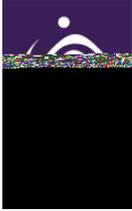
Within digital broadcast there are too many degrees of freedom concerning the actual parameters to be set in the end-user device. Users cannot change these parameters or are not allowed to change them since the parameters are linked to the service subscription. A Mobile TV device becomes useless in other networks than the home network, even when those networks are based on the same standards.

10 Risk assessment

10.1 Spectrum allocation for Mobile TV

The key issue for the success of Mobile TV technology deployment is predicated on reliable and predictable access to the category of spectrum that enables the most efficient and economic use of the frequency spectrum on a harmonized basis. The presence of harmonised bands for Mobile TV could enable faster market growth as upfront fixed costs, in developing terminals, can be spread over many more users.

Obviously if fragmented and spread-out frequency bands are allocated to Mobile TV usage, then handset vendors would need to make handsets that are either, capable of operating across all these bands at an added complexity and cost, or are



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exclusively specified and developed for a single operator in smaller quantities driving up the costs for consumers as the economies of scale would not be achieved.

Based on this large impact on handsets cost a major aspect associated with spectrum bands is to provide an adequate contiguous amount of spectrum. The number of simultaneous TV programmes that could be offered is dependent on the amount of the available spectrum depending on the segmentation of the market; for Mobile TV this factor could determine the overall viability and economic success of the Mobile TV services.

Today, it is well-acknowledged that the most likely and desirable source of spectrum among many other candidate bands for Mobile TV, is the UHF band within the context of the “Digital Dividend” as result of the switchover from analogue to digital broadcasting. The availability of a minimum of 2 mux (i.e. 16 MHz) per country would be ideal.

Some countries intent to auction the L band for Mobile TV which would make deployment expensive (e.g. many more sites are needed, less TV channels of same quality per MHz are possible than for the UHF band and lack of economies of scale for devices).

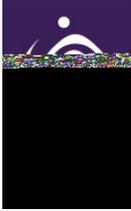
The availability of suitable spectrum, in countries and regions with large enough markets can promote wider deployments also in less developed areas. Furthermore, the allocated frequency band can have a major impact on the cost of deploying radio networks. Lower frequency bands imply larger cells (all other factors being equal) and hence lower costs of deployment. These cost savings can be significant, which is of exceptional importance when deploying in remote and sparsely populated areas.

Complex frequency planning issues could arise to ensure coexistence of different broadcasting networks topology e.g. between those intended for fixed rooftop reception and those planned for indoor portable/Mobile TV reception. This may be minimized by harmonizing a suitable UHF sub-band for mobile applications allowing for improved terminal performance/reduced network costs and simple interference mitigation scenarios.

10.2 Other challenges

10.2.1 Infrastructure

As technology innovations emerge, the compatibility and inter-working of different solutions are becoming crucial factors to ensure both the attractiveness of the ecosystem and also its ability to grow. For example, the compatibility between various codec standards (MPEG4/ H264) and/or optional high efficiency codec implementation is a key element for the success of Mobile TV. The lack of innovation at platform level could rapidly become a barrier to deliver increased quality, capacity and new applications.



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Hence a fair balance between innovation and backward compatibility based on technology agnostic principles need to be considered very carefully so that industry fragmentation is avoided and consequently, more viable Mobile TV ecosystem can result.

10.2.2 Terminals and Software

The consumer devices or terminals represent the final path for the innovation adoption by the market. This is mainly due to the availability of capable devices, the innovation compatibility with the existing device park, the price of the capable devices (representing more than the two third of the total equipment cost for the consumer and the mobile service provider), and also their heterogeneous form factors and display resolution, their configurations and profile settings.

Therefore, as in the case of infrastructure, again a fair balance between innovation, backward compatibility with the existing devices, minimal additional bill of material, display, and profiling is needed to ensure the commercial success of the Mobile TV ecosystem in a secure fashion.

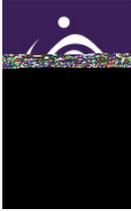
Furthermore, the service must appear as unique to the user irrespective of the underlying technology and regardless of the Mobile TV technologies: 2G/3G unicast, 2G/3G MBMS and Mobile Broadcast deployed. The realization of a hybrid Unicast/Broadcast service could be made possible by provision of a common Service Guide for all types of accesses by the network, making it possible for the client to access the same content on the most convenient technology at any given time and place (e.g. Mobile Broadcast outdoor, MBMS indoor, Unicast for VoD content etc.). However, this will only be achieved with a common EPG/ESG standard in place, and when all handset manufacturers implement it; it would also guarantee interoperability in a multivendor environment. Today, most trials have been carried out with just one or two supplier's devices.

10.2.3 Fragmentation across countries

Many trials have been carried out using different technologies to gain experience in terms of implementation and deployment cost besides creating customer awareness and research of the customer patterns and acceptance. Very few operators have really made a choice and started offering commercial Broadcast Mobile TV services.

The major challenge for operators is to find the right cost structure and mix of complementary technologies to accomplish an investment plan that will still boost a profit at the end of the day. The benefits offered by building a big ecosystem will be difficult to achieve. Besides, Operators may be faced with fast growing non-cellular wireless devices cannibalizing their revenues.

In a fragmented environment interoperability and also the management of the clients needed in the different devices will be complex, although multi-mode chipsets are being made available to OEMs and a common service interface can address interoperability as mentioned above. Roaming is yet another reason cited in favour of common Mobile TV frequencies to allow subscribers to enjoy Mobile TV content



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while traveling. This reasoning does not withstand scrutiny, though unlike voice, TV is a culture-specific application.

10.2.4 Regulatory uncertainties

There is no common legal and regulatory framework for Mobile TV service today. Both the regulation and the spectrum licensing procedure will influence the business model for the commercial delivery of a Mobile TV service to consumers. Many years ago, countries adopted media or audiovisual regulation specific to fixed broadcast television services. However Mobile TV is already anticipated to be a “*New Medium*” for which legacy broadcast television regulations will not be suitable. Overall the industry seeks regulators to adopt a light touch regulation for this new service.

Telecommunications and broadcast legislation are often handled by two different bodies. This creates ambiguities for market actors in their appraisal of their business cases related to Mobile TV broadcast services.

It is important to consider the licensing process as a commercial Mobile TV service requires a license to access the frequencies necessary for the operation of the network. In the case of “broadcasting” spectrum, this license may fall under a similar legal and regulatory framework to traditional television services.

The Mobile TV service license could also be tied to a specific content regulation as to how this service is delivered. For example, regulators may require the service or part of the service to be a free model, or subject to must-carry rules, etc.

In view of these potential restrictions and the unpredictability of Mobile TV usage and behaviours it is of paramount importance for regulators to adopt a flexible licensing and regulatory approach in order to provide increased flexibility and market incentives to invest in a sustainable and attractive Mobile TV service.

Therefore Mobile TV services will also benefit from a legal procedure involving a single national spectrum license for the delivery of the service and the operation of the entire multiplex. This will avoid potential market distortion and will result in a healthy competitive environment for the ultimate benefit of the future consumers. Such license should be made available on an open and transparent basis to any market stakeholder interested in investing in the delivery of a Mobile TV service.

Finally, clear and predictable usage rules also need to be provided for such a license in order for future Mobile TV market investors to assess their risks and the future return on investment particularly favoured by a long term license. In conclusion, in view of the nascent status of the Mobile TV market as well as the need for significant investment for the build-out of these networks, it is important for regulators to adopt well in advance a clear, transparent and flexible set of rights and obligations attached to the spectrum licensing process (i.e. network and services authorization) in order to allow applicants to make investment commitment.



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10.2.5 Freedom of circulation of handsets

Benefits of freedom of global circulation of devices in the cellular world was key to creating a mass-market cellular services appreciated by the citizens of the world. Yet, there are still a few countries that require customs declaration and clearance before the device can be used in the country (e.g. Uruguay). The future devices have the ability to receive TV signals and are more or less embedded setup boxes and as such remain subject to different type approval conformity assessment. Besides, some countries have imposed taxation on such terminals and notebooks but even more on the content that resides on the device which has an impact in the business plan.

10.2.6 Relationships

Content is considered to be “king” and the most crucial element for making this business a success. Users will only be willing to pay for Mobile TV services if there is compelling content and they get their value for money. In the mean time, a number of relationships have started between content providers and MNOs where the content providers based on the kind of agreements not only produce content for MNOs but they have even let MNO handle content rights. However, content broadcasters, content providers; advertisers’ are only successful as long as they understand the User behaviour, patterns and choice of content. Most MNOs have customer relationship management (CRM) and content management (CM) in place and as such know their customers’ wishes. However, content providers and Advertisers feel that they receive more statistical information on customer appreciation and behaviour on linear Broadcasting than from cellular networks or MNOs. Due to this and some other uncertainties described in this document, one can see that the budgets and investment from content providers and advertisers in Mobile TV are currently very low. They need to understand the potential of this new market and there are significant issues relating to ownership of the customer; a middle way forward for good collaboration still has to be found.



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11 Intellectual property rights

Patents provide incentives for innovation, which in turn leads to more successful products and new business opportunities. Studies so far show that patents and investment in R&D are key factors for economic growth and consumer welfare. Access to publications of well-known international standardisation bodies (ETSI, IEEE and so on) can significantly help companies to develop new patents and products and thereby improve their market position.

As technology innovations emerge, new IPR structures may be implemented inconsistently with existing IPR policies adopted by standardisation bodies such as ETSI. Several standardisation projects are subject to membership only. In addition, patent pool principles and/or licensing terms and conditions for existing Mobile TV standards may not be transparent or clear at this stage for relevant stakeholders.

Under normal circumstances, development of competitive strategies for products based on international and regional standards is an integral part of today's business strategy and this is becoming more and more critical nowadays as in the case of Mobile TV. A key component of this strategy is licensing rights for patents that are absolutely necessary for design. Such patents are in general known as "*Essential Patents*".

In this context the application of "**F**air, **R**easonable **A**nd **N**on-**D**iscriminatory" (FRAND) licensing approach for all technologies is a key element. The commitment to FRAND licensing for each technology concerned (such as the Mobile TV technologies under discussion in this document) should be addressed through negotiations between a licensee and licensor, depending on the business environment and circumstances. In order to establish best and efficient FRAND approach, the patent essentiality, licensing terms and conditions that would be acceptable to both licensors and licensees should be considered with care.

It is also worthwhile to note that the IPR licensing regime along with FRAND firstly, needs to be **Transparent** – all license fees should be clearly stated including clarity on any agreement terms available between licensors and including also clarity on process to deal with the IPR of any 3rd party not currently involved in providing the technology. Secondly, **the Commitment** aspects should be fulfilled, i.e. the license fees should cover the technology as proposed along with any additional fees for any enhancements, if necessary. Thirdly, it should be **Non-predatory**, i.e. license fees should be clearly and solely associated with the technology provided. Moreover, it should also satisfy the **Open-availability** principle in which there should be no limit to the availability of the terms provided and these terms should be accessible without delay to all licensees.

Finally, IPR related issues were also emphasized in the recommendations of the Joint Mobile TV Group which states that the European Commission and relevant standardization bodies ensure relevant stakeholders comply with FRAND principles and obligations to establish clear business terms and conditions regarding Mobile TV standards.



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12 Recommendations & Key Success Factors

Mobile TV is still in its infancy, and the need for massive investment in a new broadcast infrastructure leads to many uncertainties about the business model that will succeed. Infrastructure sharing implies a joint construction of the broadcaster network by a group of network operators or the use on a regional basis of infrastructure rolled-out by Broadcast Operators; this will help to reduce the costs involved. If properly implemented, existing provisions in the Regulatory Framework for Electronic Communications as well as competition rules provide a good base for the regulation of mobile broadcasting and should not be amended. Nevertheless, it is necessary to first create an environment for the successful deployment of Mobile TV.

12.1.1 Recommendations

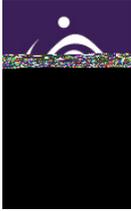
Actions to be taken by different bodies have been broken down as follows:

Recommendations to the European Commission to be taken at EC level

- Radio spectrum should be harmonised in Europe and made available without charging large license fees in order to create a healthy environment for the development of Mobile TV as a promising extension to fixed TV.
- Regulation should relax and be flexible for stakeholders to invest in Mobile TV and all EC countries should immediately take steps to abandon any legislation barriers that would slow down the success of Multimedia services including Mobile TV in Europe.
- Undertake the necessary arrangements regarding copyright regulation to enable Users to watch the TV content while they are travelling abroad and encourage all content and broadcasters to deliver beyond their current boundaries in accordance with the open competition rules.
- The Commission considers Mobile TV to be a nascent service and inappropriate obligations should not be imposed. For example, must-carry obligations are not permitted for a nascent service, and other traditional broadcast obligations may not be appropriate for Mobile TV.

Recommendations to Governments and Regulators as a whole, to stimulate a prosperous growth of Mobile TV to ensure sustainable business models

- Immediately publish a roadmap for the allocation of spectrum and appropriate licensing procedures to enable the mass market commercialisation of Mobile TV services in the next few years.
- Mobile TV as well as all other mobile multimedia content and services, are exempted from specific broadcasting regulation.



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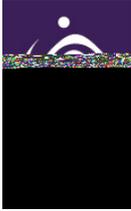
- Mobile TV enabled devices should not be subject to any license or other fees to enable free circulation of devices, and no fees should be imposed on devices that innovate towards the needs and demands of the socialization and welfare of global citizens.
- Although in some countries beauty contest auction for Mobile TV license with a certain population coverage obligation might seem attractive; in large countries population coverage obligations might mean up front heavy investments and should only be in a phased approach if at all.
- In the case of subsidisation by a state, terrestrial TV broadcasting, cable or satellite and Mobile TV broadcasting networks should be treated similarly.
- Sufficient broadcast spectrum needs to be allocated to support a minimum set of Mobile TV channels.
- Spectrum to be allocated for Mobile TV needs to be harmonized on a regional basis so that the operating frequency range for mobile TV does not exceed a reasonable and efficient frequency separation.

Recommendations to market actors at all levels

- Content providers and Advertisers should collaborate with MNOs in driving the growth of Mobile TV and extending their reach for Mobile TV content and interactivity in addition to traditional fixed television services. Hence, Content providers and Advertisers should not fear investment implications for Mobile TV.
- Broadcasters should drive interactivity services via Mobile networks, for the benefit of increasing revenues for all parties involved.
- Developing usage patterns will be Key for advertising and should be more transparent for all parties involved.

12.1.2 Key Success Factors for Mobile Operators

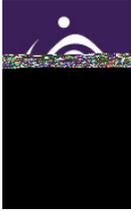
- That User requirements and demand are well respected and that affordable & transparent pricing, a wide choice of handsets both high and low-end, appealing content & interactivity and a good user experience providing ease of use are offered.
- Technology must be complemented by other critical ingredients to achieve success with Mobile TV and video.
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- A Mobile TV Service should be a seamless combination of Unicast and broadcast services, including both indoor and rural coverage.
- The take-up of Mobile TV needs a transparent and light-touch regulatory environment.
- In order to avoid fragmentation and take advantage of economies of scales, MNO's should widely deploy a SIM based content protection standard and standardized network concepts, although complementing broadcast only deployments will most probably not necessarily support this standard.
- MNOs will face the challenge of new competition and as such revisit the value chain every six months and make the necessary adjustments to their Business models. There is no "one business model" fit for all.
- MNOs must secure early relationship with broadcasters and content aggregators/brokers, who will have a critical role to play in driving growth.
- Although, the investment is high, revenues are low and the ROI longer at the beginning, Mobile operators should understand that Mobile TV will drive 3G handset adoption and will vastly increase the acceptance of broadband access and the use of data automatically increasing data ARPU.
- Mobile operators should continue deploying Mobile TV services to drive mobile data revenues, interactive services, and usage patterns.
- Advertising is undoubtedly an important item in Mobile TV, but it needs to evolve to match the viewing habits and target specific tolerance of the user. Therefore, it needs to be tailored for the user segment.



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13 ANNEX

13.1 Austria

Austrian operators belong to the pioneers in Mobile TV. The track record begins in 2004 when mobilkom Austria launched the worldwide first 24-hour live television streaming service directly to mobile devices. In addition to live mobile TV services, operators offer special Mobile TV content and made for Mobile TV programs. These services are provided as a live TV premium service based on additional service charge or on demand (VoD³¹).

Improved audio quality and image quality now is offered with HD Mobile TV the next generation of service level for Mobile TV. It uses H.264 video coding technology, handsets with better display resolution as well as an increased bit-rate via UMTS and preferably HSDPA.

To enlarge the reach of Mobile TV by overcoming limiting factors such as cell-capacity in mobile networks, a pre-commercial Mobile TV Pilot³² was launched by an Austrian consortium consisting of mobile network operators (MNOs), broadcasters, operators providing the terrestrial broadcast transmission network and other partners from industry and academia³³. The pilot was based on DVB-H technology and deployed in Vienna during the first half of 2007. The trial focused on technology, terminals, content formats for Mobile TV as well as business models and the evaluation of the user experience.

DVB-H was chosen because of its possibility to build on an existing broadcasting infrastructure and the open standard also recommended by various international bodies.

In addition to trialing DVB-H standard the common pilot platform, "Mobile TV Austria" not only offered national TV programs via the mobile handset but also dedicated content specifically produced for Mobile TV. Moreover, the MNOs also acted as program aggregators. The integrated electronic service guides (ESGs) enabled an overview and easy access to the individually offered services³⁴.

On September 12, 2007, the Austrian Regulatory Authority for Broadcasting and Telecommunications (RTR) announced a request for tender to build and operate a nation-wide multiplex-platform for mobile terrestrial broadcasting³⁵. According to the tender the applicants for the license have to ensure signal quality as conformed by European Standards³⁶. Furthermore applicants have to show how to engage with interested partners (broadcasters, program aggregator's e.g. mobile service providers).

³¹ Video on Demand

³² <http://www.mobiletvaustria.at>

³³ mobilkom austria AG, Hutchison 3 Austria, ORF, ORS, Siemens AG Österreich, FH Salzburg

³⁴ Provisioning of multiple ESGs clients originating from different service providers within one multiplex.

³⁵ <http://www.rtr.at/en/rf/MUXDAusschr> (only available in German)

³⁶ Digital Video Broadcasting – Transmission System for Handheld Terminals (DVB-H)



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As defined by the tender mobile TV services will be offered in basic and prime packages. The basic package is to offer mainly broadcaster programs which are public low (free-to-view channels) whereas the prime package is open to other program offers.

As the tender is still open the business model is under discussion. The working thesis is that for Mobile TV an access fee will apply. This access fee would partly cover the costs accrued for network and service deployment, data transfer and enabled handsets. The pricing structure will be important for the acceptance to customers, for broadcasters and advertisers as well as this can create additional reach (or “eyeballs”).

It is expected that in addition to broadcasting free-to-view Mobile TV programs (based only on access fees); mobile operators will offer special mobile TV content, made for mobile TV programs. These services are provided as a live TV premium service based on an additional service charge on the multiplex platform or on demand via UMTS and HSPA.

13.2 China

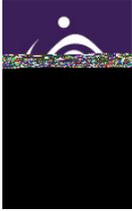
The Dragon Mobile service in Shanghai based on ROK technology enables video streaming over 2.5 G network. In August 2007, Dragon Mobile CEO claimed 2.1 million Mobile TV users, including 250,000 paid-for subscriptions, at rates as low as \$1.60 a month.

Chinese Mobile TV is considered to be a potential market. Instat forecast that, by 2009, China will have 94 million Mobile TV subscribers. Many overseas and local suppliers are battling in China. Almost all Mobile TV technologies including DVB-T/H, DMB-T/S, Media-FLO, and DVB-SH are involved in this campaign. But today it is obvious that these overseas technologies do not have any chance in future Mobile TV market in background of Chinese innovation-self, thus local many technologies will have a great opportunity to share this huge market.

Chinese national standardization administration is now making national standard for Mobile TV. Five technologies (DVB-TH from Tsinghua, T-MMB from nufront, CMMB from SARFT, CMB from Huawei and CDMA from national standardization association) have joined the test and evaluation.

China government has not allocated formally any spectrum to Mobile TV use. It is said the band of 2635 to 2660MHz will be assigned to CMMB standard (physical is STiMi) which was released as industry standard by SARFT in 2006. But SARFT CMMB field trial that is preparing for Olympic game is now networked in U band. Another standard T-MMB supported by China MII is now studying coexistence with TD-SCDMA, and maybe it uses TD-SCDMA spectrum. But T-MMB physical layer is from DAB. Thus use of L band (1452~1492MHz) is possible.

CMMB strongly supported by SARFT is doing field trials in 6 Olympic cities and started in July 2007, with a target to provide Mobile TV service together with satellite



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during Beijing Olympic Games. First CMMB terrestrial network in Shanghai was finished this month. But it has some uncertain factors, such as CMMB terrestrial transmitter immaturity and possibility of successful satellite launch next year.

During Beijing Olympics, T-DMB using Samsung terminals and 3 national candidate standard technologies will be used within UHF as well as L bands in different cities. The National technologies can be seen as trials. It is not known what terminals will be used for the trials.

13.3 Finland

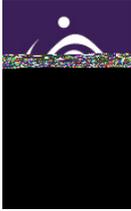
In Finland, two licenses are required for Mobile TV/broadcast operations.

- First, according to the Communications Market Act (393/2003), a network-operating license is required for the building of a mobile broadcast network.
- Second, according to the Act on Television and Radio Operations (744/1998) a program operating (service) license is required for a radio or television channel.

The Ministry of Transport and Communications licensed a neutral network operator in Finland to solve the problem of scarce spectrum resources. In addition, the Ministry expects that the neutral network operator will share the spectrum resource with the service operators and content providers. Based on its neutral position in the market and its technical competence in DVB-H, Digita has got the first DVB-H network license in March 2006, and then, built and operated the shared DVB-H network. The license terms require that Digita must sell DVB-H capacity to all program license holders under equal terms. No single entity is allowed to purchase more than one third of the capacity. According to the network license terms, the network needs to cover at least 40% of the population by 1.12.2007. The Finnish DVB-H network already covers Helsinki, Turku, Tampere, Espoo, Vantaa, and Oulu, about 29% of the Finnish citizens in these cities. The future expansions of the network will be agreed on jointly by Digita, content providers and service operators. Digita will still make the necessary network investments. The 2007 network rollout of 2007 is a combination of the most populated areas and the main roads in Finland. The mobile network operators in Finland are the two largest mobile operators Elisa and TeliaSonera. The content providers in Finland are radio and TV broadcasters. Service provider in Finland is every player in the mobile broadcast value chain excluding Digita. According to the license terms, Digita is not itself allowed to function as a service operator, participate in the consumer business or in the content business.

Digita currently offers 4 channels (experimental TV / Interactive Radio ...) besides a regional concept (IPE located in region). Plus TV is a channel aggregator with own program offering and YLE (Finnish Broadcaster), Telia Sonera & Elisa are still negotiating with Digita. The commercial re-launch is planned for 2 Q 2008.

The device used is Nokia 7710, equipped with a module of DVB-H. The cost for access is 4.9 euros per month. Non-free channels are proposed as well.



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The early users showed an open attitude towards the new service, as 58% participants were optimistic for the future of Mobile TV. More than 40% were ready to pay for an offer like this, and half of them preferred the price of around 10 euros. In general, the service in the form of a package is in favour of customers; however, some of them are still interested in a service, in which the user has more rights to choose specific programs.

The average time for watching the TV programs through mobile is about 20 minutes per day, instead of an obvious peak time for audience, the usage of time is quite average during the whole day. The Finland national channels are proved to be the most popular, and the next are the sport and the news channels (CNN, BBC World and Euro news).

13.4 France

French authorities are deeply involved in the matter of Mobile TV. They expect that Mobile TV will eventually create jobs in the order of 10,000 in France. It is expected that it drives the European industry, the audiovisual sector, and that it improves access to Multimedia towards the general public. 2G/3G is heavily deployed in France by the 3 Mobile Network operators: Orange, SFR and Bouygues Telecom. Several DVB-H trials have been carried out in France, who has now officially selected DVB-H as the technology for Mobile TV broadcasting.

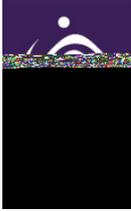
The media regulator are to issue a call for tender for the DVB-H spectrum, which will be attributed, after the selection process, to channel editors for the most of it, and potentially a small part towards some service providers.

According to the audiovisual law, the selected TV editors will create the multiplex operator, and MNOs can be part of the mux operator provided they contribute significantly to the funding of the broadcasting costs of the TV channels they distribute.

One of the identified issues is the coverage. Current planning shows that a wide coverage with DVB-H will not be possible in short term. The reason is cost and frequency planning issues. Therefore, a complement with other frequency bands and technologies might be considered.

The business model is yet to be defined, but most players (all 3 MNOs and most TV channel editors) believe a free-to-air model is not sustainable, as potential revenues from advertising won't be sufficient to compensate for all DVB-H costs (network deployment, handset distribution and possible subsidizing...).

Therefore, the contemplated model is based on an "access fee" that would be charged by the MNOs to the end users, so that they can get access to the basic TV content (on top of a basic package, there would be Pay-TV bouquets as usual in the TV world). Such revenue would partly be used to pay for DVB-H cost. In such a model, both TV editors and MNOs would contribute to the broadcasting cost, in a proportion that still needs to be defined, as the whole model itself.



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French media regulator CSA has launched a tender for thirteen national terrestrial mobile TV licences. The TV services can be full-time or shared-time, generalist or thematic, and free of charge or pay, encrypted. Companies and not for profit entities are allowed to bid by the deadline of 15 January 2008.

- CSA will grant licenses individually to each elected TV stations who will then have two months to finalize a commercial proposal as well as create a consortium along with the mobile operators interested in participating “significantly” to the network build-out and transmission.
- Mux composition is 16 channels including 3 channels pre-empted to the public service; 250 kbps pre-empted to radio channels and 150 kbps for additional services. Any new TV stations or program will require a separate “convention” from the CSA.
- Coverage specifies only outdoor coverage of 30% 3 years after the licenses grant date and 60% 6 years after.

Candidates have proposed up to 40 channels to be broadcast on mobile TV service in France³⁷. Media regulator CSA has until April 2008 to select the winners of 13 TV channels. No group will be allowed to have more than 3 TV channels. All of the major French TV groups have presented bids. Orange aims for two TV channels, one aimed at young adults and its sports news channel, already available via ADSL TV, the internet and at its mobile phone portal. Newcomers include start-up company Mobibase with a channel called One TV Plus and a joint bid by Les Echos, l'Equipe TV and horse racing channel Equidia, which have formed a JV to offer a sports and news channel.

Licences will be awarded in April 2008, and services must be ready to start within two months of receipt of the licence. Commercial services are thus anticipated at the end of next year.

Under the licence terms, the winning channels will have to cover 30 percent of the population within three years, rising to 60 percent within six years. In addition to the thirteen channels being offered, the French government has reserved three channels, one for France 2, one for Arte and a third yet to be determined. CSA has also reserved space for five to nine mobile radio stations, and more interactive services. Public consultations will be launched before further licensing tenders.

13.5 Germany

Early January 2008, in Germany, there were four mobile TV service providers, as shown in the table below. MFD (Mobiles Fernsehen Deutschland) offers the service “watcha” since June 2006 which is based on T-DMB and distributed by mobile service providers’ debitel and mobilcom as well as the MVNO simply. The service is now available in 22 cities. Service uptake is low due to the limited content offer (only

³⁷ Les Echos 16 January 2008



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4 TV channels). Early 2007 the MDF service had only 10,000 subscribers (since then no subscriber figures have been officially published).

The watcha service includes the following features:

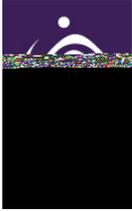
- Two public channels: ARD and ZDF
- Two private channels: ProSiebenSat.1 Mobile and MTV Music
- A visual radio, i.e. broadcasting of text and pictures synchronised with the audio programming: bigFM2see
- Up to 135 digital radio stations

The mobile network operators T-Mobile and Vodafone are offering a larger choice of TV channels and compatible mobile phones to a larger share of the population. No subscriber figures have been reported. Besides, the mobile video sharing service provider Viif is offering a mobile TV service since November 2007, in co-operation with the media broadcasting group ProSiebenSat.1.

service provider	service launch	service coverage	mobile phone capability	TV channels	price range
MFD	June 2006	T-DMB service 16 conurbations >20%population	LG V900 and Samsung P900	4	debitel, mobilcom: 5€/mth – 9€/mth
T-Mobile	May 2006 (streaming) DVB trials summer 2006	UMTS network covering 50k+ cities. >60%population	32 models from 7 vendors	19	basic, soccer erotic packages 2 - 3€/day 5 - 10€/mth
Viif (mobile video sharing)	November 2007	UMTS networks	200 different video telephony capable phones	9	up to 0.58€/min
Vodafone	2004 (streaming) DVB trials summer 2006	UMTS/HSDPA network 2200 cities >80%population	34 models from 8 vendors	36	1.99€/day 7.50 – 15€/mth
Vodafone	early 2008 pilot service	HSDPA network >80%population	HSDPA phones & PC's	4	free of charge

Regarding revenue sharing, MFD needs to pay the content providers for the contents and T-Systems for the broadcast network. However, they can receive subsidiary costs from debitel and Mobilcom after covering the market, billing, and terminal payments.

DVB-H



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Mobile3.0 was considered the most neutral parties to enable competition in the market and to protect the interest of both the broadcasters and the mobile operators. While both licenses specified DVB-H, they are subject to compliance to economic and competition criteria to be agreed by the LMAs.

Mobile 3.0 is a joint venture of MFD and NEVA Media that was created on October 10th, 2007. NEVA media main shareholders are the media groups Hubert Burda Media and Georg von Holtzbrinck. Officially, the new company aims at operating a neutral platform and at providing mobile TV and related value added services in partnership with content service providers and telecom operators. Mobile 3.0 is expected invest a several hundred million euros in mobile TV. The first mobile TV services should start for the UEFA football European cup in June 2008.

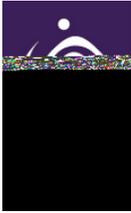
Mobile 3.0 had to present the broadcasting authorities a proposition for the use of the TV capacity (16 channels) before 9th November 2007. The TV services should include programmes from public channels ARD and ZDF as well as from private broadcasters RTL and ProSiebenSat.1, in addition to one channel for regional programmes and four radio channels. Early November 2007, Mobile 3.0 failed to supply some required necessary documents, in particular official agreements with private and public TV broadcasters. At the end of December 2007, Mobile 3.0 presented its revised programme proposal. The company succeeded to close contracts with broadcasters ARD, ZDF, RTL and ProSiebenSat.1.

Because of the regulations of the German Telecommunication law, the Mobile Service Operator' consortium (Mobile3.0) cannot directly operate the broadcast network which will be operated by the German broadcast network operator - T-Systems.

Based on the media regulation rules, the service licensee is able to define the contents to be distributed over the broadcast network according to the terms and conditions ultimately set by the LMAs. Hereby the service operator will act as a channel and service aggregator to provide the complete service packages which will possibly include:

- A basic package – with extensive well-established public and private “free - to-air” TV and radio channels. Comparable to cable TV fee, the service might be available to customers paying a fee covering mainly broadcast network transmission/operation costs, individually fixed by each of the mobile network operators or the mobile virtual network operators.
- Premium channels - This may include channels with exclusive content for some of the service providers only. Customers normally receive their content, case by case or based on a subscription for one or several channels.
- Interactive services - may be offered based on the addition of a GSM or UMTS connection to the broadcasted content.

This business model has yet to be finalized and will follow a review procedure by the State Media Authorities prior to the issuing of the final license to Mobile3.0



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Once the regional broadcasting authorities officially give their final allocation decision, Mobile 3.0 will start the deployment of the DVB-H network, targeting the UEFA football European cup for the commercial start. The monthly subscription for the mobile TV service is expected to cost €10 for all the 16 TV channels and €5 for eight TV channels. Mobile 3.0 should sell the complete TV package (16 channels) for half the price to the mobile operators and service providers.

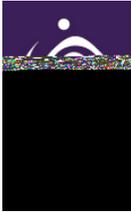
13.6 Italy

The Italian Regulator guided the development to assure market attractiveness for all actors on equal basis. In Italy the rules were straight forward, all operators who had got the license for DVB-T could also broadcast the programs by DVB-H over the same bands, whereby each broadcaster and each telecom operator could own no more than one DVB-H multiplex. DVB-H only channels are not counted into the 20% antitrust limit for terrestrial TV channels. Commercial broadcasters could not own more than 20% of national free terrestrial TV channels. Under the condition that Mediaset would not have direct access to DVB-H customers and would not collect incremental advertising revenues over the DVB-H platform Mediaset, acquisition of a DVB-H multiplex from Europa TV was approved. Mediaset is a carrier for all telcos and packager of its channel bouquet (e.g. simulcast commercial channels + premium events such as soccer). Mediaset channels are available to all MNOs. Recently RAI announced that it was interested in offering DVB-H.

3 Italia launched its service in May 2006 after spending an undisclosed amount of money in order to acquire Canale 7 (fourth largest broadcaster) and as such the UHF spectrum it needed; whereas Mediaset spent 321M\$. In the first case, this cost is born directly by the operator and in the second case, spectrum acquisition costs were shared amongst the operators reselling Mediaset's network capacity, namely Vodafone Italy and Telecom Italia Mobiles (TIM). Moreover, operators relying on a third party's Mobile TV network will be forced to share revenues in exchange—on top of the cost of content. In the case of "3", since a broadcaster was acquired the issue of obtaining a broadcasting license was negotiated and solved very quickly. "3" considers itself to be a media company and not a cellular operator.

Both Networks in Italy offer service to 75% outdoor and large cities, In-car, indoor (all main cities/urban areas). In Italy, there is no access to free-to-air channels. The Broadcaster cannot control their brand and have no access to the content. This is SW locked, and currently there are very few terminal brands (2-3) and models (4-5).

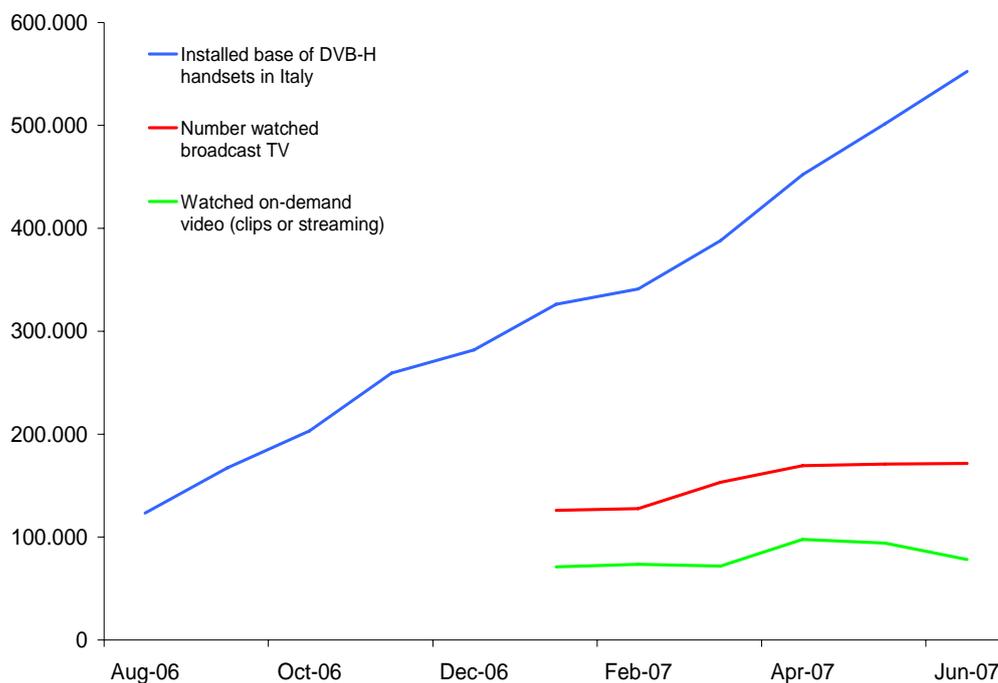
"3" launched an exclusive sports channel called 93 Minutes, which delivers live streaming of national soccer games, with exclusive commentary and interviews from the stadium, and edited highlights of other games 30 minutes earlier than the equivalent terrestrial TV channels. 3 in Italy has also been running "video fiction" services since February 2004, combining streaming of made-for mobile movies and mobile games.



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The offer was presented in a package of services for customers with a cost of 49 euros. The terminal device used (SAMSUNG or LG) are subsidized and costs 250 euros and terminals without the subsidy costs 600 euros. In July 2006, the “3” had 100,000 clients for the TV service, of whom 70% were new subscribers. 60% clients used the TV service at home. The operator have ordered 500 000 terminals for their distribution estimated till the end of 2006.



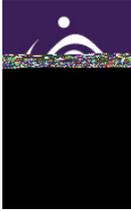
Decreasing percentage of active DVB-H users at “3”³⁸

Figure 12.6.1: Italian Status

Reti Radiotelevisive Digitali (RRD), who has designed and built out the nationwide DVB-H network for 40 million people in Italy or 75% of the Italian population, rolled out 1000 transmitters with 5W to 2.5KW across the country with a further 300 DVB-H gap filler transmitters is “3” Italia’s business partner for the service. On the other side, the RRD is also responsible for maintaining and developing the services, aggregating, encoding, and encapsulating the channels to form the basic service package, like “La3 Live”- a kind of “table of content” channel where 18 young “3”jays alternate in talking about what is on air on the other channels. Through its 5,000 shops spread across the country and its 5 call centers it has aggressively marketed the DVB-H service.

There are two complete service packages available:

³⁸ M:Metrics “The reality of mobile TV & video consumption today” – IBC conference 9 September 2007



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Basic Package: all the channels

Premium Package: all channels plus Canale playboy

Each of the packages is billed separately on a subscription base in terms of the time of access, for example:

- 1 day of access for all the channels at €2
- 1 week of access for all the channels at €9
- 1 month of access for all the channels at €19
- 6 months of access for all the channels at €59

The business model is based on the DVB-H TV service, which costs less than €1/day and the terminals' cost is similar with to the other UMTS terminals. "3" Italia estimates the cost of the DVB-H network at €220 million, supplying its own content could cost it another €10 million per year, and would spend €50 million at best yearly for additional TV content.

Mediaset has deployed a dedicated MUX, Channel management/trading to ensure most UHF CH < 49 with Maintenance & service continuity for transmission. In addition they have deployed head-end, mainly Outdoor coverage, 100 cities with 400 TX, 1000 urban repeaters 2,5 + 2,5 Mbps that are allocated to TIM and Vodafone.

Stand alone Mobile TV

The monthly subscription costs €5 and the handset price in this package for the Samsung P920 is €499.

TIM TV Telefono relax

This is a combined Mobile TV + communication package. The monthly subscription for TIM TV is €5.

For the device, the customer can get a UMTS/DVB-H handset with a lower contribution of €199 + a monthly rate of €10 for 24 months. If the customer with a TIM TV subscription, is able to guarantee a minimum amount of 25 €/month of traffic during the month, the €10 monthly rate of the handset is reduced to €0.

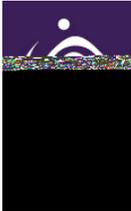
TIM TV Tutto relax

This is a combined Mobile TV to communication package. All services are packaged into a fixed monthly subscription of 49 €/month.

The package comprises:

1. Opening the access to the basic TIM TV service
2. 1000 free SMS/month
3. 1000 minutes of voice calls and video calls at 0 cent/min+ fixed charge of €16 cents/ call up. Customers can get an UMTS/DVB-H handset with one lower fee of €99 + 24 monthly fees of €1 for each month.

For both broadcast capacity and the Mediaset service, TIM and Vodafone will pay Mediaset 75 Million € p.a., each for 5 years.



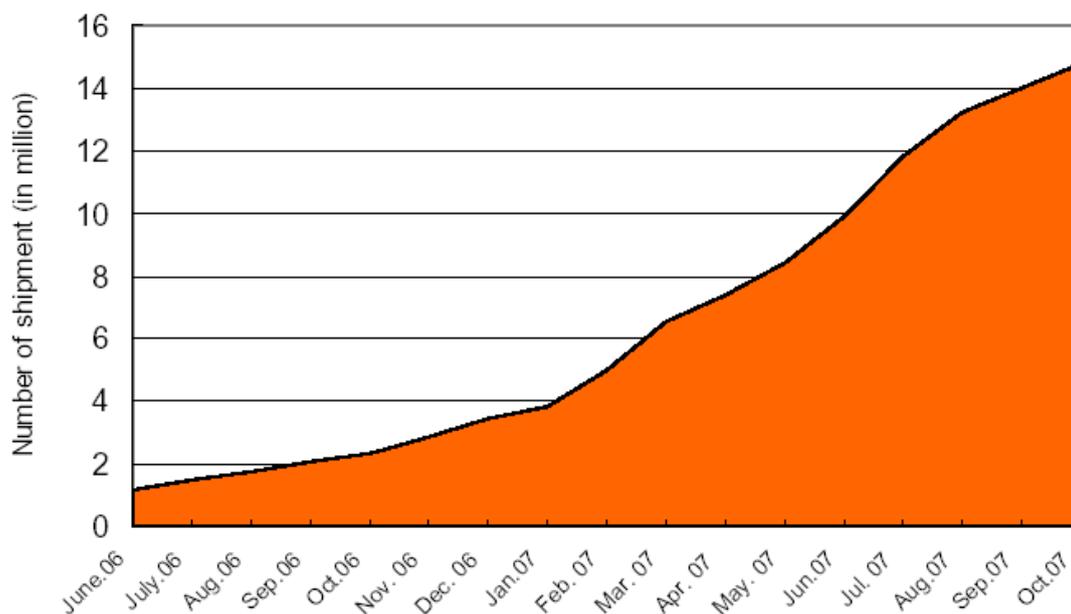
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13.7 Japan

Two separate Mobile TV infrastructures do exist in Japan. Only the free of charge terrestrial service is relevant in the context of this paper³⁹. The terrestrial ISDB-T⁴⁰ service in Japan is an embedded part of the digital TV infrastructure. Every mux is divided in 13 “segments,” HDTV occupies 12 segments, and the remaining segment is used for mobile receivers. This explains the name “1seg. Broadcasters do not need a dedicated broadcasting license due to 1seg’s positioning as “supplementary broadcasting”. 1seg has to offer the same broadcasting programs as digital terrestrial TV.

By the end of March 2007, the three operators had shipped nearly 7 million 1seg handsets. The three operators expect to ship a combined 20 million 1seg capable devices during the fiscal year 2007 (ending 30 March 2008), roughly over 40% of all handset shipments⁴¹. As there are currently 97 million mobile subscribers this would mean that in April 2008 one out of four Japanese subscribers will own a 1seg



handset.

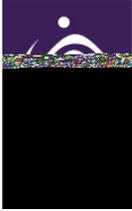
Figure: 12.7.1– 1Seg device shipments in Japan

With the growing number of 1seg devices, a commercial-based business model is of increasing interest for the various players. Only TV broadcasters with a radio station license are currently allowed to broadcast content.

³⁹ The World's first satellite based S-DMB provider MoHaBO! is not allowed to build terrestrial repeaters enhancing urban, indoor and underground reception and is consequently not targeting mobile phone users.

⁴⁰ Integrated Services Digital Broadcasting Terrestrial

⁴¹ KDDI president Tadashi Onodera, May 2007



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The regulator (MIC) sent a Broadcasting Law Reform proposal to the Japanese parliament that includes a proposal to lift of the ban for 1seg specific content. If this proposal could be accepted by the parliament, premium content specific to 1seg could become possible. Meanwhile KDDI is working on creative concepts with TV station Asahi such as KDDI advertisements in regular TV music programs linked to KDDI music service LISMO via the electronic service guide. KDDI and Asahi are pioneering similar concepts for online shopping and for ring tones.

13.8 South Africa

MultiChoice is a multi-channel pay television platform with channels from Africa, UK, Europe, Asia, and USA. It provides premium television entertainment to over one million digital subscribers in South Africa through its DStv Bouquet.

In 1st November 2005, MultiChoice Africa began trials of mobile television in two phases. The first phase of trial conducted under trial permission from ICASA, used Nokia trial head-end equipment and Nokia 7710 handset prototype, with free handsets, free content in a 600x field trial within Gauteng. The second phase of trial started 9th June 2006 (in time for 2006 World Cup kick-off) with free handsets and free content, commercially ready Sagem handsets and Irdeto conditional access. DStv channels and made for mobile channels were field trials within Soweto, Johannesburg, Pretoria, Cape Town, and Durban.

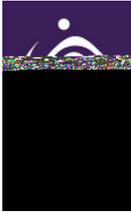
In South Africa, the Mobile Broadcast TV value chain contains content creation, channel packaging, content distribution, Broadcast Services, Transmission signal Distribution, Subscriber management Services, Marketing Retail & Installation and Subscribers at home.

The service covers 11 kinds of content: sport, entertainment, news, music, and some other Made-for-Mobile services. The business model in South Africa is Pay-per-view, but currently free to those who purchase or rent handsets. MTN is offering the Samsung P910 to customers on its MyCall 100 contract for an extra 299 rand. The retail price is around 4,000 rand.

13.9 South Korea

Two competing Mobile TV infrastructures exist in South Korea: a premium satellite based service (S-DMB) and a free of charge terrestrial service (T-DMB). This competitive situation has been enabled by regulatory actions which resulted in two spectrum allocations. Behind the services are two competing “power blocks”: broadcasting versus telecoms and two radically different business-revenue models.

SK Telecom founded TU Media to commercialise S-DMB services. The commercial introduction of S-DMB was delayed until May 2005 in order to provide the regulator time for the terrestrial licenses to be awarded. TU media has service distribution agreements with the three major mobile operators. Users are obliged to subscribe to mobile telephony services to be able to use the S-DMB service. The current monthly charge is around 8.5 euro per month. The service comprises 12 video (with 15 frames/sec quality) and 26 radio/audio channels. The satellite coverage is complemented by thousands of repeater stations (10,000 by the end of 2006).



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Revenues are split as follows: 25% to the mobile operator, 30% to program content providers and the remaining 45% is retained by TU Media.

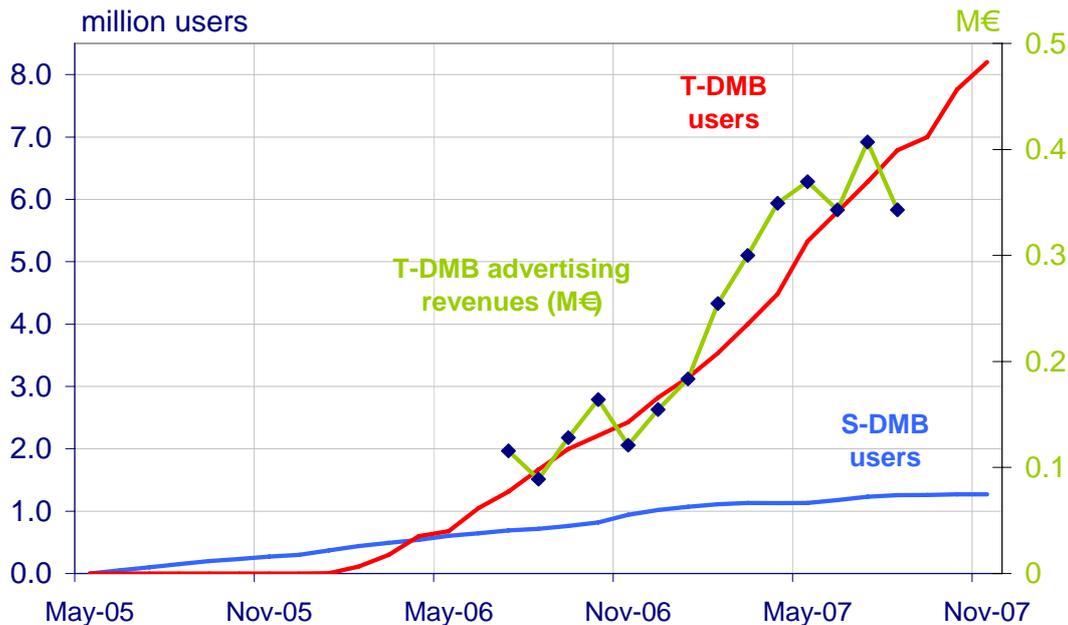


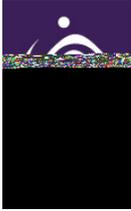
Figure 12.9.1: Korea T-DMB versus S-DMB status and advertising revenues

In March 2005 the Korean Broadcasting Commission (KBC) granted six T-DMB licenses: three to the terrestrial broadcasters KBS, MBC, SBS and three to non-terrestrial broadcasters: YTN (news cable channel), U1 Media (radio) and Korea DMB (a group of electronics manufacturers and content providers). The service is free of charge and is available in the Seoul metropolitan area being expanded nationwide the coming years. Based on the digital audio broadcasting (DAB) network the Korean T-DMB system could operate 7 video (30 frames/sec), 13 audio and 8 data channels. The cost of T-DMB gap-fillers to facilitate coverage within the Seoul subway is recovered through the price of T-DMB devices.

The T-DMB broadcasters complain about the regulatory restrictions that limit the amount of advertising slots they can sell within the programming. Advertisements can only be aired in between and not during programs for example. The Korean T-DMB committee expects 5.5 million euro advertising revenues during 2007. Average T-DMB advertising revenues are around 7 eurocents per month per user.

13.10 Spain

More than 20 trials in the following cities have been conducted: Madrid, Barcelona, Valencia, Sevilla, Zaragoza, Gijón and Alcázar de San Juan with different broadcast network operators (Abertis, Axión, Castilla-La Mancha Telecom), mobile operators (Telefónica Móviles, Vodafone and Orange) and TV operators



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(RTVE, Telecinco, Antena 3, Cuatro, Net TV, Veo TV, Telemadrid, Canal Sur, Castilla-La Mancha Television, TV3 and Canal 9).

All these trials were with the DVB-H standard, and only some demos in the 3GSM Congress have shown the rest of standards such as T-DMB, Media FLO, DVB-SH.

The National Technical Plan for Digital Terrestrial TV includes plans for one digital multiplex for Mobile TV in the transition period from analogue to digital TV.

Telefonica offers a total of 41 TV channels (via unicast) that includes CNN International, Boomerang, Cartoon Network, Fox, MTV, National Geographic, etc, for 5 €/month and free until January 08. Vodafone live TV has an offer of 30 general TV channels for a monthly fee of €6, or a pay TV offer from Digital+ of 16 TV channels for the same fee. Orange has a 30 TV channels panel with a price of €1 per 20 minutes viewing and €3 per 20 minutes in the case of adult channels.

The Spanish Government has disclosed the outline of its plan to regulate broadcast Mobile TV in Spain. It intends to implement it by an amendment to the Law of Measures for Promoting the Information Society, currently in the Spanish Parliament's Agenda, to be discussed at the end of 2007.

A two-tier-licensing scheme is being proposed similar to the Finnish model:

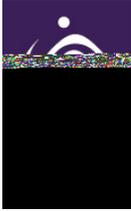
- One Broadcast Network Operating License, including spectrum rights
- Unlimited amount of Service Provider Licenses

The separation between spectrum holder and service provider is a new issue for Spanish Broadcasters which could lift an entry barrier to its traditional market.

The Broadcast Network Operating License is at National level for operating the only mobile Multiplex, including spectrum rights, to be granted through public contest, under telecommunications current legislation. It will include coverage obligations to provide service to 56 province capitals with indoor and mobile coverage.

Regarding the License for Service Providers there will be no distinction regarding the kind of License for Satellite Radio and Mobile TV, both Terrestrial and Satellite. This licence will be granted to anyone who adheres to specific rules, with no limits of number of Licenses or years of time. License holders should use an electronic communication network for the provision of the service. They have to negotiate with the broadcast network operator, under rules not yet specified.

Terrestrial Mobile TV Licenses: The Government grants Licenses to National or Multi-regional level Service Providers and Regional Authorities grant Licenses to Regional or Local level Service Providers. Applicants must detail: coverage, network to be used, technical specifications, and commercial details about the service and the channels included. In an attempt to speed up the launch of DVB-H Mobile TV, the Ministry of Industry has opened public consultations with all key players involved



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in the market up to next April 26 aimed at laying the groundwork for the launch of the service by year end.

- Regulator expect to start beauty contest for datacast license in November 2007
- DVB-H license granting expected latest March 2008
- DVB-H service may be launched in 8 cities in summer 2008 possibly due to existing trial infrastructure

13.11 Switzerland

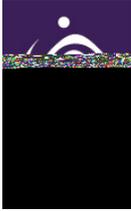
In Switzerland, OFCOM recently issued a call for tender for a Mobile TV service based on a single long term (10 years) service spectrum license open to any new entrants willing to invest in the provision of this service and comply with the requirements set forth in the "Mobile TV National Concession". The call for tender was closed on July 2007 with an anticipated output for the granting of the license toward end of September 2007.

In its "Concession" BAKOM adopted a flexible and open regulatory framework with clear and predictable technical requirements over the frequency allocation hence the network build-out. Also, the "concession" does not presume any explicit Mobile TV programming structure or any specific assumption over the service distribution and/or retail commercial arrangements. The spectrum licensing process is based on a beauty contest whose criteria include in particular coverage roll-out (30%, decisive parameter); project concept and realization (20%); business model including market analysis and risk assessment (20%); media diversity including existing, public as well as new innovative programs (20%); and finally the project coherence and credibility (10%).

As of 2002, and in view of the strong monopoly position of Swisscom Broadcast, fully owned Swisscom subsidiary, Swisscom Broadcast SA in Bern did receive the license to become the transmission network operating entity (based on DVB-H standard), benefiting from their market position to access preferred sites as well as key programming rights. They will have to provide their first offer for the European football championship in 2008 in Basel, Bern, Zurich and Geneva.

- The Licence duration is 10 years
- 8 MHz bandwidth
- obligations:
 - End of May 2008 - coverage 44 % of populations
 - End 2012 - coverage 60 % of population
 - open to all TV Channels and telecommunications providers

Swisscom and the two other Swiss mobile operators Sunrise and Orange Switzerland created a joint venture for the commercial launch of a DVB-H based mobile TV service. Mid December 2007, Orange and Sunrise decided to withdraw from the joint project. Swisscom is continuing preparations for DVB-H based services for the European Football Championships in June 2008. The Swisscom



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Broadcast target remains to give at least 44% of the Swiss population access to mobile TV broadcast in time of the European Football Championships. The core offer will comprise some 20 TV channels as well as additional content conceived especially for mobile TV and UEFA EURO 2008.

13.12 UK

In the UK most mobile operators provide video streaming over their 3G networks, but this is generally video-on-demand clips, rather than full live services.

There have been a number of broadcast Mobile TV trials in the UK, involving DVB-H, MediaFLO, T-DMB, DVB-SH and TDtv technology. BT Movio launched a DAB-IP broadcast service in mid-2006, with 4 live TV channels, but this attracted very few customers and the service will be withdrawn early in 2008.

The biggest issue affecting the deployment of a broadcast Mobile TV service in the UK has been the availability of spectrum. Potentially spectrum is already available in L-band and S-Band; four of the mobile operators were also allocated TDD spectrum as part of the original 3G licence auction. Significant UHF spectrum only becomes available as part of the Digital Dividend Review (DDR), as a result of the analogue switch-off in the UK (scheduled to be completed during 2012); however, a single UHF channel, channel 36, will be clear to use nationwide by mid-2008.

The UK regulator, Ofcom, has stated that allocation of the L-Band spectrum will now take place early in 2008 on a technology neutral basis; Ofcom has also indicated that UHF channel 36 could be allocated earlier than the main DDR auction, but there is no certainty that this channel will be made available for broadcast Mobile TV.

Although UK trials have shown a desire for Mobile TV, it is unclear when deployment of a broadcast service might take place given the current uncertainty over spectrum. OFCOM the UK regulator has announced auction of L-Band frequencies in 2008 and that channel 36 would be free early 2009.

Should service providers opt to utilise L-Band spectrum as an alternative, the additional infrastructure expenditure involved would probably mean that such a venture would not be cost-effective.

Meanwhile multiple mobile operators in the UK are preparing a commercial TDtv trial in London (i.e. within the M25 ring road) due to be launched second half of 2008. The TDtv network will make use of 2 x 5 MHz TDD spectrum owned by two of the participating mobile network operators. A 10 MHz network could host up to 28 high quality mobile TV channels. A key milestone for the pilot will be the introduction of the first TDtv handsets and devices.

However, following the exit of the BT/Virgin Mobile DAB-IP offering from the market and despite the imminent commercial TDtv trial in the greater London area second half of 2008, the UK is not expected to relaunch commercial mobile broadcast TV services until 2010 at the very earliest, well behind most of its European neighbours.



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13.13 US

So far, the US benefits from the absence of most of the Mobile TV regulatory entanglements witnessed in other countries. In particular, no broadcasters were given a Mobile TV license-spectrum as heritage of their broadcasting legacy, and no MNOs were offered any similar favor. Instead, in all three cases (Modeo, QUALCOMM, and Hiwire), the spectrum was paid for in fully transparent FCC auctions allowing new players to invest and choose the right to use whatever technology they chose, and to offer any service/application that appealed to them the most.

While Hiwire subsidiary of Aloha Partners announced its intention to pursue a Mobile TV commercial launch based on DVB-H standard in their 700MHz licenses acquired in the FCC auction for two 6 MHz channel (54 and 59), AT&T recently purchased in October 2007 Aloha's 700 MHz licenses⁴². AT&T has not officially announced their plans in terms of usage of these licenses; however, they are legally allowed to deploy a Mobile TV network based on their technology of choices (including over 3G networks).

Verizon Wireless has launched commercial Mobile TV services based on MediaFLO standard on March 1st 2007. This launch will be followed later this year by AT&T. Both wireless carriers are retailing and selling directly to their subscribers Mobile TV services provided on a wholesale basis by MediaFLO USA Inc., the Mobile TV operating company subsidiary of Qualcomm. MediaFLO USA Inc. uses UHF spectrum licenses covering the entire US which were acquired by Qualcomm following the FCC auction of one 6 MHz channel 55 based on six large geographic license areas that provide a national footprint.

Verizon Wireless retails the services with a basic package of 8 Mobile TV channels at \$15 a month (including the purchase of subsidized phones to date from Samsung, LG, and Motorola). Verizon also offered one combined package for their existing 3G V CAST and broadcast channels for a total amount of \$25 a month (more details on Verizon Mobile TV offer on their website⁴³). MediaFLO USA is responsible for building and operating the network as well acquiring and packaging the content based on commercial negotiations/contracts with both broadcasters, content providers as well as the wireless carriers. MediaFLO USA provides both broadcast TV and cable networks programs as part of a new distribution channel including existing and made-for-mobile customized content (full-length programs, news, sports, highlights, clips, etc.). MediaFLO USA has agreements to obtain and deliver content from CBS, ESPN, FOX, MTV Networks (MTV Music TV, Nickelodeon, and Comedy Central) and NBC Universal (NBC2GO, NBC News2GO).

The FCC auction of the lower 700 MHz in the US was held prior to the final DTV switch-off and all new 700 MHz licensees such as Aloha Partners – now AT&T and Qualcomm, will be required to protect existing incumbent TV stations from interference until February 2009, switch-off date mandated by the Federal government. While spectrum-clearing activities continue, MediaFLO USA provides

⁴² <http://www.moconews.net/entry/419-att-buys-alohas-spectrum-for-25-billion-aloha-exiting-out-of-mobile-tv/>

⁴³ <http://products.vzw.com/index.aspx?id=mobileTV#overview>



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Mobile TV coverage to over 40 US major markets including New York, Los Angeles, Chicago, Dallas, Orlando, Las Vegas, etc. (see complete list on the Verizon website) “However, these post auction operations did not require any forced partnership with the broadcasters. The US process for the time being is as straightforward as things can get, and neither the Congress nor the FCC is in any hurry to throw layers of regulation on a new medium before it is even born” “The US MoTV happenings will definitely get much more complex, simply reflecting on the size and the sophistication of both Media and Telecoms markets, but they at least started simply enough without preconditions on how the market will decide on things.” (Quotes TeleAnalytics Report July 2006).

9th April 2007, the Advanced Television Systems Committee (ATSC⁴⁴) announced the development of a new standard ATSC-M/H to enable broadcasters to deliver television content and data to mobile and handheld devices via their digital terrestrial TV broadcast infrastructure. A key requirement is that the air interface be backwards compatible with the existing ATSC terrestrial DTV standard. Thus, none of the existing major Mobile TV technology air interfaces are eligible. A new air interface is being defined. May 2007 a RFP for the standard was filed. July 2007 the ATSC received ten proposals. The major proponents are grouped mainly by air interface, but the major end-to-end system proposals came from two teams: a) LGE and Harris; and b) Samsung and Rohde & Schwarz. Several other companies contributed system components, including Thomson, Qualcomm, and Nokia, among others. The Nokia proposal is broadly based on OMA BCAST.

The ATSC standard is still in an early phase of development and while the local broadcaster community has publicly expressed support for the standardization effort – mainly via the newly formed Open Mobile Video Coalition, neither they nor any wireless operator has publicly committed to a commercial launched based on the anticipated new standards. ATSC considers it highly desirable that broadcasters should have the opportunity to announce new ATSC mobile and handheld broadcast services before the close of analogue services in February 2009.

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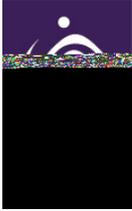


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Acronymes and Abbreviations

ARPU	Average Revenue per User
3G	Third Generation
CAPEX	Capital Expenditure
CDMB	combination of China's 3G standards TD-SCDMA as well as the DAB
CEPT	Conférence Européenne des administrations des Postes et des Télécommunications (European Conference of Postal and Telecommunications Administrations)
CMCC	China Mobile Corporation
CMMB	Full Standard including S-TIMI
DAB	Digital Audio Broadcasting
DCF	Discounted Cash Flow
DMB	Digital Multimedia Broadcasting
DRM	Digital Rights Management
DVB	Digital Video Broadcasting
DVB-H	Digital Video Broadcast-Handheld
DVB-SH	DVB – Satellite services for Handhelds
DVB-T	DVB-Terrestrial
EPG	Electronic Programme Guide
EC	European Commission
EU	European Union
ECC TG4	Electronic Communications Committee
ESG	Electronic Service Guide
ETSI	European Telecommunications Standards Institute
EU	European Union
FRAND	Fair Reasonable And Non Discriminatory
FDD	Frequency Division Duplex
GOM	Gross Operating Margin
GSM	Global System for Mobile communications
HD	High density
HSPA	High Speed Packet Access (Down and Uplink)
IPR	Intellectual Property Rights
ISDB	International Standard for Digital Broadcasting
ISDB-T	International Standard for Digital Broadcasting-Terrestrial
ITU	International Telecommunication Union
MBMS	Multimedia Broadcast Multicast Service
MII	Ministry of Information Industry
MNO	Mobile Network Operator
MSS	Mobile Satellite Systems
MUX	Multiplexer
QoS	Quality of Service
ROI	Return on Investment
RRC-06	Regional Radiocommunication Conference 2006
RSPG	Radio Spectrum Policy Group
SARTF	State Administration for Radio, Film and Television
S-DMB	Satellite Digital Multimedia Broadcasting



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SIM	Subscriber Identity Module
S-TIMI	Mobile TV standard being developed by SARFT
T-DMB	Terrestrial DMB
TDD	Time Division Duplex
T-MMB	Mobile TV standard being developed by MII
TV	Television
WRC-07	World Radiocommunication Conference 2007
UHF	Ultra High Frequency
UMTS	Universal Mobile Telecommunications System
USIM	Universal Subscriber Identity Module