

Mobile television in Europe State of the art and current regulatory issues

Over the past couple of years technologies have been developed in order to broadcast audiovisual content to mobile devices. Unlike 3G networks, through which TV content is delivered and received in a one-to-one mode, the technologies we are referring to enable truly one-to-many broadcasting, allowing linear services and programs usually broadcast to fixed TV receivers to be received through mobile phones and other handheld devices.

This overcomes the major limitations of 3G systems, whose networks can easily become overloaded when used to receive mainstream channels and other popular video services.

The other advantage of mobile TV technologies, besides a more rational usage of the spectrum, is the low cost: as the transmission of content doesn't occupy a portion of the band for each user connected, video services can be offered at relatively low cost and at a flat rate, rather than on a pay-per-use basis.

The DVB-H technology, a declination of the DVB standard, is the technology which is at the moment gaining more popularity in Europe, although it is not the only available choice. One of its main strengths lays mainly in its compatibility with the DVB-T standards that allows synergies in countries where DTT network have been extensively rolled out and digital terrestrial television has already reached a good degree of penetration.

The purpose of this paper is to provide a brief overview of available technologies, the state of the art in European countries and the main regulatory issues raised.

1	Mobile TV technologies ¹				
	Terrestrial			Satellite	
	MBMS	DVB-H	DMB	DVB-S	S-DMB
Frequency band	UMTS	UHF	VHF - L	Ku-Ka	S
Technology	Broadcast extension of 3G	Extension of DVB-T	Extension of DAB	DVB-S (same used for DTH)	Evolution of S-DAB
Status	Available in 2007	Commercial service in Italy Trials across Europe	Available in Germany in 2006		Commercial service in Korea

Several technologies have been developed in order to broadcast live television to handheld receivers. Some of them are based on terrestrial networks and frequencies band, other use satellite networks integrated with terrestrial repeater to enable indoor reception. A brief explanation on the

¹ This will be a brief overview, with a very low technological content, meant to give some basic information on the major features of available technologies that have an impact on regulatory issues. For more in depth technical reference, please consult :

“Télévision numérique et mobilité” M. Boudet de Montplaisir, August 2005

www.ddm.gouv.fr/IMG/pdf/boudet_tvmobile-5.pdf

“Unlimited mobile TV for the mass market” February 2006,

www.alcatel.com/publications/abstract.jhtml?repositoryItem=tcn%3A172-641831635

“Television on a handheld receiver - broadcasting with DVB-H” www.digitag.org

two main technologies available in Europe is presented in this paper, whereas for details on other technologies for mobile television some reference texts are indicated in the footnote #1.

DVB-H

DVB-H² has been developed as an extension of the DVB-T, a standard which already has portable and mobile capabilities. It has been designed to overcome two key limitations of the DVB-T when used for handheld devices: it lowers battery power consumption (allowing users to receive TV programming for longer period of times without wearing out the batteries) and improves robustness of the signal so it can be received also indoor and on the move on devices with built-in antennas, like mobile phones.

An interesting feature of the standard is that DVBH program can be bundled with regular DVB-T programs in the same multiplex (through the so called “hierarchical transmission”). This allows, for instance, operators that already have a DTT network in place to improve its coverage through the addition of gap fillers and dedicate a portion of the available capacity to broadcast content for mobile reception, while reserving the rest for traditional DTT programming.

The disadvantage with this network configuration is a loss of efficiency: if you build a (more expensive) network for indoor reception, it doesn’t make a lot of sense to use a portion of it for traditional programming. Most of the operators are therefore focusing on strategies based on the roll out of networks dedicated exclusively to DVB-H programming.

As far as the spectrum usage is concerned, it should also be remarked that UHF and VHF band are not equivalent in terms of service. Due to the reduced antenna size and possible interferences with GSM, only a portion of the UHF band (between 474 MHz and 700-750 MHz) is ideal for DVB-H services.

DMB and S-DMB (Digital media broadcasting)

DMB and S-DMB are both extension of the DAB, the digital audio broadcasting standard. The first one uses terrestrial networks whereas S-DMB uses satellite networks. Its compatibility with the DAB standards allows the upgrading of existing DAB networks at minimum costs to allow the broadcasting of video content. For this reasons, in countries where DAB networks have been implemented, the DMB system appears as a natural evolution. The strength of this technology is that DAB is a technology originally conceived and designed for mobile reception; on the other hand though, the repeaters in a DAB/DMB network have a more limited coverage than a DTT one, so the costs for the networks may be higher than DVB-H. Additionally, the antennas needed for mobile reception are slightly bigger than the ones for DVB-H.

The S-DMB system implemented in Korea and Japan is an hybrid system: it allows for direct reception from satellite networks (in rural areas for instance) whereas it relies on terrestrial repeaters to provide coverage indoor and in other areas not covered by satellite (urban areas with high density of buildings, for instance). This requires higher initial investments, including the lease of satellite capacity and the roll-out of the gap-fillers network.

² European standard ETSI EN 302 304.

The value chain in the mobile television services will very likely consist of several functions carried out by one or more operators:

- a) The **network operator**, in charge of setting up and manage the mobile TV network;
- b) the **platform operator (or service provider)**, in charge of putting together the content line up, provide the conditional access system, billing and customer management. The service provider will rent capacity from the network operator, put together a line up of channels and offer it to the final user. In Italy, so far, this function is performed almost exclusively by mobile operators that can exploit their know-how in dealing with their customer base. Traditional broadcasters, not used to have a direct relationship with their viewers, will probably have more problems to function as platform operators.
- c) the **content provider**, that is the editor of the programs/channels broadcast to the mobile devices. Traditional broadcasters, thematic channels or new content providers will licence their content to the platform operators that will include it in their bouquets.

In the initial phase of development, a relatively important part will also be played by the **technology providers** such as the manufacturers of handsets and network components. Given the strategic role of these operators, in many countries they have been included in the groups set up to carry out mobile TV trials.

As we said, in the typical business configuration, the service provider will rent capacity from the network operator, put together a line up of channel (acquiring DVB-H broadcasting rights from the right holders or from the content providers) and offer it to the final user.

Nevertheless, given the scarcity of the terrestrial spectrum³ in those countries where analogue transmissions have not yet been switched off, it is possible that a new segment of the value chain will emerge, that is the **wholesale content aggregator**. As most platform operators will likely include in their line up the same channels and programs (e.g. traditional mainstream free-to-air channels, popular thematic channels such as music, documentaries and sports channels), in order to optimize the use of the spectrum, it could make sense to have a third party (or a consortium of operators) acting as “wholesale content aggregator”. In such scenario, all or part of the most popular programs could be licensed, aggregated and broadcast only once on the mobile network (encrypted using different technologies) by this intermediary, then sold as a wholesale package to the different service providers (e.g. the mobile phone companies). The service providers in charge of the retail sale to the end users could then use their portion of the transmission capacity to enrich and personalise their specific offer (e.g. by adding different channels or content) in order to differentiate them from those of the other competitors.

As far as business models are concerned, it is likely that mobile TV providers will adopt a two-tier scheme very similar to that implemented by most pay-tv operators:

- a “basic” package of pay-tv channel offered at a flat, daily, weekly or monthly rate which includes the rebroadcast of some free-to air channels;
- some premium channels, offered “*a la carte*”.

The average price for the basic package according to the business plans of the operators may go from 10 to 20€ per month according to the variety and quantity of channels included.

³ In Italy for instance so far the capacity exists only for two DVB-H national multiplexes, one managed by Mediaset and one by “3” Italy.

As mobile operators are strongly involved in the distribution of mobile TV services, we expect a tendency towards the integration of UMTS and DVB-H services in Italy, in order to optimise the usage of both networks. DVB-H, mainly developed on the UHF bands will be likely used for mainstream content and live TV, whereas UMTS will be used for interactive services and video-on-demand as well as for the transmission of content to small groups of users in multicast technology.

Although the specificities of mobile TV reception (few inches screens, possibly used for short periods of time) would suggest that specific audiovisual content would be produced or adapted, so far the offers made available by the mobile TV service providers are based mainly on the rebroadcast of traditional TV schedules, suggesting that mobile TV is perceived by the operators mainly as a way to “extend” the reception of traditional TV outside the house. Some operators though are considering the development of specific programming conceived and produced expressly for a mobile reception, such as shorter formats (e.g. reformatting existing fiction or documentaries in order to have shorter episodes) with enhanced graphics and images conceived to optimise the reception on small screens. 3 Italy, for instance, has already created two new channels - 3 TV and 3 Sports - based on this concept.

3

The state of the art in Europe

Development of mobile TV services in Italy

During the summer of 2005, “3” Italy - one of the four national mobile companies - announced its plans to develop a DVB-H network in Italy. In December 2005, 3 acquired a local broadcaster in northern Italy who had already been issued a DTT nationwide licence (with the commitment to cover 50% of population in 6 months). The operator acquired by 3 is now called 3Ietronica Industriale, it converted its DVB-T title also in DVB-H (following AGCOM regulation n. 266/06/CONS) and is carrying on a further extension of its coverage in DVB-H.

At the same time Mediaset, the major commercial broadcaster and DTT operator, announced its plans to develop its own DVB-H national network. In order to do so, it acquired one of the existing national analogue network (Europa TV) and turned it into a digital terrestrial network, expressly designed for DVB-H service. Mediaset strategy was to lease $\frac{3}{4}$ of the capacity of the DVB-H network to the three mobile operators (TIM, Vodafone and Wind) which have not developed their own DVB-H networks, while keeping the remaining capacity to broadcast its own channels.

Following an economic and regulatory assessment of the situation and a public consultation, AGCOM issued a specific regulation (n. 266/06/CONS) in order to allow a rational and effective development of the services. The regulation allows operators interested in creating mobile TV networks in DVB-H standard to get licenses and start up the services.

In line with the principle of technological neutrality, the regulation establishes that network operators holding licenses for DTT can use a portion of their capacity to broadcast programs using DVB-H standard within their multiplexes. They have to inform the Ministry of communication in order to extend their existing DTT license.

As far as multiplexes solely dedicated to mobile television are concerned, each network operator can be licensed to operate only one DVB-H network. All provisions applying to content for DTT programs also apply to content delivered in DVB-H standard.

Unlike what is happening with DTT, where the majority of network/multiplex operator are keeping the control on all levels of the value chain, mobile TV services in Italy are developing along two different models:

- “3” is developing a business model based on a strong vertical integration both upstream (it has created its own network) and downstream (it has developed its own channels);
- the other mobile operators (TIM and Vodafone) are focusing almost exclusively on their role of platform operators, providing an interface between the content and the final users. The network is owned and managed by Mediaset, while the programming is provided by a number of content providers (Tim has already signed agreements with SKY and Fox as well as including in its offer free-to-air channels provided by Mediaset and RAI).

“3” has launched its services during the World Cup, with a marketing strategy based on a combination of attractive content, strong subsidies for customers to purchase DVB-H compatible mobile phones⁴, and a sim-lock policy⁵.

The basic offer, which includes La3 sport, SKY sport, SKY TG 24, SKY vivo, SKY Cinema, some of the general interest channels (RAI uno and due as well as Mediaset’s Canale 5, Italia uno, Rete 4 and Boing) most of the Italian football league matches (Milan, Inter, Roma, Lazio, Torino, Messina, Atalanta, Livorno, Reggina, Juventus), and the UEFA championship matches, is offered at a promotional price at 19€per month.

3 has reported 160.000 subscribers to its mobile video services (September 2006), and plans to reach 500.000 customers by the end of the year. According to researches conducted by Eurisko, 3 has acquired approximately 3.000 new customers per day, although most of the subscribers have been acquired during the World Cup. 70% of the video-mobile users are new customers and only 30% are existing “3” customers that have upgraded their subscription (and their mobile phone) to receive mobile TV services.

If soccer is definitely a driver, a new peak in the client acquisition rate should occur between September and November. In order to exploit the beginning of the new football season, “3” has launched additional commercial promotions for new customers, such as free basic TV package until the end of the year or free of charge mobile phone for those who subscribe by mid-October to a bundled offer including voice services as well as TV content.

TIM, the mobile division of Telecom Italia, has also launched its mobile TV services at the end of the summer. In this case though, the TV offer rather than a driver to acquire new clients is designed and retailed mainly as a “complementary” and additional service to the main offer (voice and data). An UMTS/DVBH mobile phone is available at a subsidised price of 50€when subscribing to one of the bundled offers proposed. TIM has a more limited line-up including its own channels (La7 and MTV) two of Mediaset mainstream channels (Canale 5 and Italia1), SKY TG 24 and SKY Meteo 24) as well as some of the matches of the national football league (those whose broadcasting rights are controlled by Telecom Italia).

As far as the other mobile operators are concerned, Vodafone, which has already leased capacity on Mediaset network, is getting ready to launch services by the end of the year, whereas Wind is not at the moment planning any mobile video offer.

Development and trial of mobile TV in the rest of Europe

In **Germany**, transmission capacity for DVB-H has initially been made available only in Hamburg and Berlin/Brandenburg. These are “remainders” of the DVB-T frequency allotments for these regions. The broadcasting authorities of Hamburg and Berlin/Brandenburg announced in 2005 an invitation to tender for capacity to be used for roll out of DVB-H networks. The pilot project was

⁴ The samsung mobile phone LG U900 is currently retailed to “3” customers at 52€

⁵ For a 24 months period the mobile phone can be used exclusively for the services provided by 3; there is also a minimum contract length of 24 months for the purchase of the basic TV package.

launched in four cities to coincide with the FIFA World Cup by mobile operators E-Plus, O2, T-Mobile and Vodafone. The pilot has been declared a success. Federal and State authorities are now expected to put in place the conditions that would allow for a rapid launch of services nationwide. As far as the regulatory framework and licensing system is concerned, the same model used for DTT will very likely be implemented for DVBH. The transmission capacity will be allocated to network operators whereas content providers will be granted broadcasting licenses which will give them the right to use a specific portion of the transmission capacities for a specific service (programming). Capacity already assigned for DTT on existing networks cannot be used in hierarchical mode for DVB-H services.

In the **UK** there is at the moment no capacity specifically assigned for use by DVB-H services. A DVB-H trial in Oxford was launched in 2005 by Arqiva, Nokia and O2, but due to the lack of available spectrum, commercial launch has not yet been planned. Mobile operators are putting a lot of pressure on the regulator to free up some spectrum at national level, but Ofcom approach is to conduct its Digital Dividend Review (DDR), which will determine what happens to terrestrial frequencies released from analogue switch-off, before making specific plans for capacity to assign to DVBH .

DVBH services are hardly feasible on the existing DTT networks as there are a number of restrictions on how the terrestrial TV multiplexes use their capacity, including an obligation to ensure that 90% of the capacity is used for "conventional" TV channels.

Ofcom is planning to make available spectrum in the L-band without specifying the uses for this spectrum. Therefore it could potentially be used for mobile multimedia services.

In order to overcome the lack of UHF/VHF spectrum, BT has instead decided to use capacity on a digital radio multiplex using DMB standard. The service runs over the existing Digital Audio Broadcasting (DAB) network and also provides access to radio channels on that network. This will allow a service with a limited number of channels. The line up at the moment includes BBC1, ITV1 and E4 while Channel 4 may join in later.

As far as content regulation is concerned, for TV real time services the same regulatory framework would apply as to current cable and satellite channels. For content to handheld devices that is not licensable (e.g. on-demand content, two-way services, websites etc) there is no Ofcom regulation, but the mobile operators have drawn up their own voluntary Code of Practice for "new content" on mobiles⁶.

In July 2005, a new national plan for DTT was approved in **Spain**. It establishes that according to the spectrum availability, the government could plan a multiplex channel for DVB-H services. At present, this multiplex hasn't been allocated yet nor assigned to a television broadcaster.

As far as existing DTT capacity is concerned, portion of the DTT multiplex (but no more than 20%) could be used to provide additional services different from the television broadcastings, like the data files and applications transmission applications, including mobile television services in DVBH standard.

In the meanwhile, some successful DVBH pilot have been conducted in Madrid and Barcelona and commercial service is expected to be launched at the beginning of 2007. In order to let the trial possible, the Ministry of Industry, Tourism and Commerce has granted authorisation to several broadcasters to provide the first DVB-H services, providing the necessary frequencies.

In **France**, the Conseil Supérieur de l'Audiovisuel has authorized in 2005 several trials of mobile television, using both DVB-H and T-DMB standards, for a 6 to 9 month period of time. These authorizations have been granted to four different companies.

⁶ Refer for instance to www.o2.co.uk/abouto2/ukcodeofpractice.html

The preparation of a new media act amending pre-existing laws has slowed down the launch of commercial DVB-H services, although full-scale mobile TV services are expected to launch sometimes during 2007.

The regulatory debate focuses on how to allocate the broadcasting capacity for DVBH services. There is some terrestrial capacity in the UHF/VHF bands still available but the CSA wants to reserve part of it to HDTV services and the remaining portion to mobile TV.

As far as the allocation criteria are concerned, the choice is between allocating the capacity to a network/service operator that will then decide the line up of channels to be delivered (this is the solution indicated in the Boudet de Montplaisir report) or to allocate the capacity to the content providers selected by CSA through a public procedure.

In countries such as **Austria, Switzerland** and **Netherland**, the existing regulatory framework allows for portions of the multiplex already licensed for DTT to be used also for DVBH services. This requires, as we pointed out before, an adaptation of the network to allow for mobile reception indoor. In this countries the same rules for content and licensing are applicable both to DTT and DVB-H.

In several countries committees have been set up to assess the issues and prepare a specific framework. In **Sweden** for instance a special committee instructed by the government was given the task to analyse and consider changes to the Radio and Television Act to allow the launch of mobile TV services. The DTT network owner, Teracom, has been allowed in the meanwhile to begin DVB-H technical trial services in the Stockholm region. Commercial services will probably not be available until 2007, after the regulatory and legal framework will be designed and put in place.

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Main regulatory issues

The technology and standard issue

The first regulatory issue at stake concerns the technology through which mobile service are made available in each countries. Two possible policy approaches can be adopted by the regulators. In some countries the competent authorities have chosen to encourage or mandate one particular standard to ensure commonality and speed up the launch of the services: thanks to this the DVB-H technology is rapidly becoming a de facto European standard. In other countries a more cautious approach has prevailed, that is to implement a “technologically neutral” regulation in order to let the market forces make the decision on standards.

DVB-H in the UHF band is considered by most stakeholders to be the most efficient choice: it allows for a great number of channels to be broadcast in a limited capacity; on top of that, due to the specificities of this standard, DVB-H networks can be rolled out at a limited cost compared to other technologies. This band though is extremely scarce and contended by many users throughout Europe: analogue broadcasting is still active almost everywhere, DTT to traditional fixed television has been given relevant portions of these bands in many countries; most broadcaster are advocating the use of UHF/VHF bands for HDTV. For this reasons, identifying other technologies for mobile TV able to exploit other segments of the spectrum has been considered by other countries as a more sensible choice. A trade off between a timely launch of mobile services and a more rational transition and an effective use of the spectrum available seems to be at stake.

A different technology issue concerns, in case the DVB-H option prevails, the possible transition from MPEG2 to MPEG4: MPEG4 allows for a better compression rate and a more efficient use of the spectrum but, on the other hand, in the countries where DTT has reached a large penetration this choice would be rather painful, as it involves the replacement of the existing base of decoders.

In any case, it remains to be decided whether to leave the market make the decision or if the regulator and government should be involved in order to protect consumer interests. Again, when discussing consumer interest a different trade off must be considered between the general interest (the efficient use of a public resource) and the interest of those families who have made an investment to purchase the digital receiver.

The spectrum issue for DVB-H

In those countries where DVB-H has been identified as the optimal choice, the most critical issue concerns the criteria for UHF/VHF spectrum allocation.

The first problem for the competent authorities is whether to allocate portion of the UHF/VHF bands for mobile TV services in DVB-H standards after complete switch off or as soon as it becomes available. The advantage in the first case is an acceleration of the launch of services, but on the other end, the risk is to allocate the capacity on a “first come first serve” basis, which could not prove the most rationale choice when a scarce resource is at stake.

More generally speaking, the digital dividend issue should be taken into consideration. As the capacity becomes available (because of progressive analogue turn off or other reasons) the regulators should assess how to “distribute” the “digital dividend” among different services requiring the same spectrum. In most European countries, different categories of operators in the communications sector are interested in UHF/VHF bands, with the two main competitors being the broadcasters (who want extra capacity to launch HD services) and mobile operators (who want to use the same capacity for mobile TV services). Again, the complexity lays in striking the right balance between the needs of the different stakeholders and the general interest.

Licensing issue

Once decided how much capacity to devote to mobile TV services, the following problems for the governments and/or regulators will be to decide how to licence the capacity and to whom.

Should the capacity be allocated to the network operator, to the service provider or to the content providers?

Given the limited capacity available on the DVB-H networks, it will very likely be not enough for all the editors and content providers willing to be distribute their programming to mobile users.

The choice to give the capacity to network or multiplex operator involves more flexibility in the business models of the mobile TV operators: they will be able to negotiate and select the channels that they consider most effective for the viewers. An allocation of the capacity made by the competent authorities on the other hand, means that such selection would be made keeping in mind criteria such as the general interest and pluralism.

Business models and free to air content

Should free to air channels stay free in the mobile TV environment? Consumer association are strongly advocating the idea that business models for mobile TV should not compromise the possibility of users to receive free-to-air channels broadcast in DVB-H standard.

Nevertheless, the experience so far in Italy shows that even the public broadcasting service channels are not being made available for free.

This depends mainly by the fact that so called “free to air channels”(PBS channel and commercial channels broadcast free of charge on terrestrial TV) are perceived as “strong brands” and “must have” on all platforms and they are consequently trying to maximise their bargaining power. As a consequence mobile TV service operators have to reach agreements in order to be allowed to include them in their offer. This involves that, once they have reached an agreement and broadcast the channels in their bouquet they encrypt the content. Or, alternatively, if the channels are already broadcast in DVBH standard prior to any agreement with service providers, they are encrypted by the content provider itself.

This is a sensible difference compared to what happens in the more traditional pay-tv environment, where free-to-air channels are to all extent receivable by anyone that has a compatible receiver. It means basically that in the mobile TV environment there is no content receivable free-of-charge beyond the specific line-ups offered by the service providers.

This situation must be carefully assessed by regulators as it may trigger some reaction by consumers association. Again, on one hand there is the general interest of the consumers/viewers who should be able to receive some free to air channels, on the other the interest of the broadcasters who have the right to benefit from the revenues collected by mobile service operators distributing their content.

It should also be taken into account though that general interest channels, normally free-to-air and financed through advertising, have clearly an advantage in being received on handheld devices, as this extend the viewing times by the audience and has some positive effect on the advertising revenues.