

# Mobile

## Broadcast Television in Europe

Executive summary



January 2008

# Introduction

## Overview

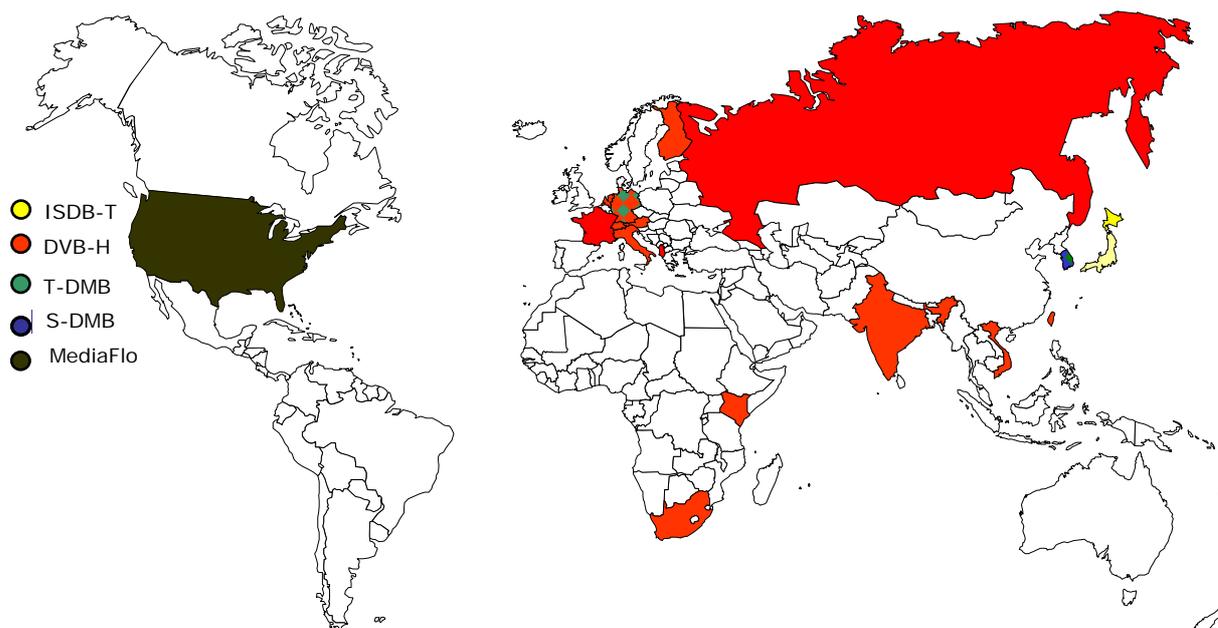
This report covers the major western European markets and is based primarily on interviews with experts and key players in the industry including broadcasters, network operators, and regulators. Primary research was conducted from August through November of 2007. All efforts have been made to ensure that information is current as of November 2007. The EBU and DigiTAG do not necessarily endorse the opinions, analysis, or forward-looking statements contained in this report.

The focus of the report is broadcast mobile television rather than the currently widespread unicast solutions offered by most mobile phone operators. The distinction is crucial for broadcasters and broadcast network operators because the investment, production, and demand aspects of broadcast technologies are very different, as the report will show.

## Global standards available

A number of different standards have been developed to provide television services to a handheld device. Mobile telecom operators can provide services using their UMTS networks with such technologies as High-Speed Downlink Packet Access (HSDPA), Multimedia Broadcast Multicast Service (MBMS) as well as TDtv and EDGE. However, these technologies are constrained by the capacity of the unicast network, although developments like HSDPA and MBMS will alleviate to some extent these constraints.

Several broadcast technologies are currently available to provide live television services. Digital Multimedia Broadcast (DMB) delivers mobile television services based on the Eureka-147 Digital Audio Broadcast (DAB) standard with additional error-correction. DAB-IP is one variant to DMB. Integrated Services Digital Broadcasting (ISDB-T), developed by Japan as its proprietary digital terrestrial television standard, provides some modes which are suitable for broadcasting for handheld reception. Two further technologies which have proven successful are MediaFLO in the United States, developed by Qualcomm, and Digital Video Broadcasting on Handhelds (DVB-H), developed by the DVB Project.



There is a clear tendency of regionalization of technology standards for broadcast mobile television. In Europe, the European Commission is favouring DVB-H using primarily the economies-of-scale argument in the hopes of replicating the success of GSM and prompting widespread adoption. In the United States, regulators have not encouraged any particular standard and with the closure of Crown Castle's Modeo DVB-H project, MediaFLO has been left as the de facto US standard. In Asia, DMB variants are predominant except for Japan with its own national solution, ISDB-T. However, different standards are crossing borders in some cases. DVB-H has been launched in Vietnam, India, Nigeria, and The Philippines. MediaFLO has been working with BSkyB and other pay operators to establish a foothold in Europe. In the long run, it may be that more than one standard is taken up in a particular market depending on spectrum availability and other issues.

### **Spectrum issues and results of the WRC-07**

The World Radiocommunication Conference 2007 (WRC-07) met in Geneva from 22 October until 16 November to discuss the worldwide use of radio frequencies and modify as necessary the Radio Regulations, the international framework governing the use of frequency spectrum and satellite orbits. The Conference brought together 164 national administrations from around the world, with countries divided into regions representing Europe, the Middle East and Africa (Region 1), the Americas (Region 2), and Russia and Asia Pacific (Region 3).

A key issue for broadcasters concerned the allocation of mobile telecom services in the terrestrial frequency bands between 470-862 MHz traditionally reserved for broadcasting. Some countries had requested that mobile services be given co-primary status alongside broadcasting in these bands.

## Spectrum and digital systems

Band	Frequencies	Analogue systems	Digital systems
Band II	87.5-108 MHz	FM radio	(DRM+)
Band III	174-230 MHz	TV	DAB/DMB, DVB-T
Band IV/V	470-862 MHz	TV	DVB-T/H
Band L	1452-1492 MHz	-	DAB/DMB/(DVB-H?)

Source: EBU<sup>1</sup>

For countries in Europe, the question raised heated debate with a common position only possible after a marathon-long discussion session. The final agreement allows for mobile telecom services to be proposed as "primary services" in the frequency bands between 790-862 MHz only from 17 June 2015. This date corresponds to the end of the analogue/digital broadcast transition period for Region 1 and Iran as established in the Geneva 2006 (GE-06) Agreement.

However, not all countries agreed with this compromise. Because the introduction of mobile services in the frequencies between 790-862 MHz is generally delayed until June 2015, 65 countries decided in two footnotes (5.316 and 5.316A) to make these frequencies available for mobile services immediately.

In Europe, these countries include Bosnia and Herzegovina, Croatia, Denmark, Finland, France, Germany, Greece, Lithuania, FYR Macedonia, Montenegro, Norway, the Netherlands, Poland, Portugal, Serbia, Sweden and Switzerland and the United Kingdom. Three countries - Lithuania, Malta and Spain - allow for their early mobile service usage but only within a limited frequency range, from 830-862 MHz.

In both of these exceptions added to the Radio Regulations, it was noted that "*stations of the mobile services .... shall not cause harmful interference to, or claim protection from, stations of services operating in accordance with the Table...*" This means that broadcast services in neighbouring countries must be given protection against interference from mobile services. In the case of Poland and Lithuania, protection must also be guaranteed for the aeronautical mobile services of neighbouring countries (i.e. Russia).

It should be noted that within the mobile service allocation, international mobile telecommunication (IMT) services have been identified as one of the possible uses. IMT services includes both IMT 2000 (3G technologies, UMTS, CDMA 2000, WiMAX) as well as IMT advanced services (4G). At the WRC-07, national administrations decided to merge IMT 2000 and IMT advanced services into a single category.

While broadcasters had requested that their status as the unique primary service in the VHF and UHF frequency bands remain unchanged, they will now need to face the possibility that mobile services may be introduced in the upper parts of the UHF band.

Several reasons have guided this decision by national administrations. First, national

<sup>1</sup> All charts are based on EBU sources and EBU commissioned research

administrations have made the assumption that the switch of broadcasting from analogue to digital will make it possible to free-up frequencies for new services, including mobile services. Thus, it is necessary to allow such services to be given access to the bands. Second, national administrations may be coveting the potential revenue that may be generated by an auction for these frequencies. It is estimated that the auction of frequencies in the 698-806 MHz in the United States will bring the government up to \$15 billion.

Finally, some national administrations wish to align themselves with the position of the European Commission which has called for the introduction of new rules to govern spectrum policy. In its proposed "Telecom Package" issued on 13 November, the Commission advocates the principle of "service neutrality" in which the type of service provided within a given frequency band is not established by policy but rather by the market. Allowing for mobile services in the UHF band provides some freeing up of constraints in the types of services that can be offered.

However, planning for the introduction of IMT (mobile) services will not be easy. In some countries, such as Spain, the bands that allow for the introduction of IMT services are currently used extensively by broadcasters for the provision of their DTT services. Making changes to the transmission network to move the current broadcast services will entail major costs, to which will be added the costs for the provision of the new IMT service transmission network.

The issue of interference will also need to be addressed. While the WRC-07 makes it clear that the allotments established in GE-06 must be respected, with services not causing more interference or requiring more protection than agreed, it will be important to ensure that broadcast services are not harmed by mobile services, particularly 'uplink' services. Some have suggested that the use of a harmonised frequency band for mobile services with guard bands on each end to protect broadcast services may be one solution. However, the allocation of such a harmonised band contradicts the Commission principle of "service neutrality" while the use of guard bands sterilizes spectrum bandwidth.

Ultimately, national administrations have provided themselves with the legal framework to provide more flexibility in the allocation of frequencies. It is possible that mobile services can be introduced in the broadcast bands, however, this will be very difficult prior to analogue switch-off and will require careful planning to avoid interference with broadcast services.

### **The role of the European Commission**

At the end of November 2007, the Council of telecommunications ministers of the European Union affirmed Commissioner Reding's call for the adoption of DVB-H as the single European standard for mobile broadcast television on a non-compulsory basis. The Council generally supported the position put forcefully in March 2007:

*"My assessment is that we are too slow and too uncoordinated to create the right conditions for a quick take-up of mobile TV on a large scale in Europe...I had asked industry in particular to address issues related to technology. The challenge is the following: providing technological solutions that are best suited to ensure the availability*

*of mobile TV anytime and everywhere, including at home, and making technological choices that allow attractive commercial offers. European industry, supported also by EU-funded research, is largely behind the technologies being used today to launch mobile TV services in the world. I therefore expected from EMBC clear answers on how to best deal with this challenge. I find the recommendations in the EMBC report too consensual. What we really need now is to decide and draft a European strategy for a swift and large take-up of mobile TV in Europe.*

*I am convinced that the use of widely recognised open standards is of paramount importance to achieve economies of scale. Only with economies of scale will we have an efficient use of spectrum, affordable handsets and rapid consumer take-up. Therefore, I am prepared to give strong support to European standardised solutions, such as DVB-H, on the condition that they provide certainty about technology licensing terms and conditions. Without this certainty and predictability, it will be impossible to invest with confidence in new innovative technologies. Industry should therefore foster work in this direction." - Viviane Reding, Hannover, Germany, 16 March 2007*

Since this statement was made it has come under attack by many industry experts. Many MEPs, especially from Germany, Britain and the Netherlands, have also expressed disagreement.

Many objected under the general rubric of "let the market decide", but specific arguments were made as well:

- In early stages of market development, competing standards often lead to greater innovation and encourage improvement in each technology as it vies against each other.
- Different standards often can be used in different frequency bands offering more flexibility of deployment depending on the national frequency situation in a particular country.
- Mandating DVB-H will not solve the problem of operators implementing different encryption systems.

At a more fundamental level, regulating a market that does not exist is always a tricky business. Sometimes similar markets can be used for guidance, however, the very nascent broadcast TV mobile resembles neither the GSM market nor the digital broadcast TV market.

The Commission wishes to encourage economies of scale to drive mobile TV. However, economies of scale need to be reached on a global scale in order for handset manufacturers to realize significant unit production savings. Driving competing technologies out of Europe forces their proponents to accelerate their efforts in other markets, particularly Asia. This may lead to regional division of standards and a counterproductive result . Most importantly, the mobile TV

market has not proliferated, not because of lack of standards, but rather because of unclear business models, limited spectrum, and questionable consumer demand.

In September, the German Federal Council (Bundesrat) decided there should be no mandatory standard for mobile TV and explicitly disagreed with the Commission's DVB-H policy. The Council went on to say that it could interfere with media pluralism and cultural diversity. Any moves to make the standard mandatory next year will likely face strong opposition.

## **Country summaries**

### **Western European markets**

#### **Austria**

Austria has decided to commit to the DVB-H standard and the regulator has initiated a call to tender for the network license. The key driver behind the launch of DVB-H services in Austria is the forthcoming Euro 2008 football tournament which will be jointly held by Austria and Switzerland in mid-2008.

A new broadcasting law was passed on the 1st August 2007 by the Austrian parliament which defined the DVB-H licensing process. The law also amends a number of existing broadcasting laws. For example, the public broadcaster ORF is permitted to make a number of "made-for-mobile" channels.

On the 14th September 2007, the regulator RTR launched a call for tender for the DVB-H network provider license. Potential bidders include the dominant broadcast network operator ORS, which is owned by the public broadcaster ORF, and mobile operators such as Mobilekom and One. The original deadline for bids was the 16th November. However, following calls for this deadline to be extended, the regulator has set a new date for receiving applications which is the 14th December 2007.

Coverage – fast roll-out and extensive population coverage will one of the key criteria evaluated by the regulator. The minimum network coverage should be 50 percent one year after the license is awarded. However, applicants will be expected to propose their own roll-out and coverage schedules and these proposals will be binding on the winning applicant.

Content aggregation - the network license holder will not be allowed to select the content on the multiplex. This will be done by content aggregators, in effect the mobile network operators (MNO), of which there are four in Austria. Each network license applicant will be required to include content packages created by the operators in the bid. A bidder could have content from all carriers or only two or three MNOs. It is possible that two bids could have exactly the same content.

With network licenses not likely to be granted until January 2008, the schedule for the launch for services is likely to be very tight and there will need to be a great deal of goodwill between the various market players to resolve copyright and other conflicts in time for the start of the Euro 2008 tournament.

## Belgium

The French-speaking community published its strategic plan for digital transition (PSTN) in July 2007. Currently the Community has available seven channels for TV broadcasting in the Bands IV and V. One is used for DTT, five for analogue transmissions and one is free. After switch-off all seven multiplexes (one SFN and six MFNs) will be devoted to television broadcast, but the amount of bandwidth eventually devoted to DVB-H has not been decided yet.

Meanwhile the channel currently free is to host a DVB-H multiplex from 2008, half of which has been licensed to the public broadcaster RTBF by the government and half is to be licensed to other providers through a call for tender. The licences will last nine years. In Band III the Community will have three T-DAB multiplexes, yet to be licensed.

Existing regulation states that the DVB-H call for tender should be aimed at network operators and, following a public consultation, the Community government wants to change the rule in order to licence channels instead. The changes should be made by a decree prior to the tender. The decree should also set the terms for the contractual relationship between RTBF and other multiplex licensees.

In the Flanders a two-year DVB-H trial started in 2006 after which a commercial DVB-H multiplex could be licensed. Public broadcaster VRT has taken an active role in developing mobile TV content, notably with re-purposed news bulletins and a fiction series edited for short episodes (or 'mobisodes') to be viewed on mobile. VRT is in a DVB-H trial partnership with the incumbent telecom operator Belgacom and its Proximus mobile division, the cable operator Telenet, Siemens, Scientific Atlanta and academic research centres. The two-year trial started in 2006. RTBF has announced in 2007 that it plans to start a pilot DVB-H bouquet of up to eight channels in the Brussels region, also in partnership with Proximus. Proximus launched a free 3G mobile TV service for its subscribers in 2005 and started charging in early 2007.

## Denmark

There is interest in mobile TV in Denmark although the various players are very cautious about committing resources to develop such services.

At the present time, it is not clear how mobile TV will develop in Denmark. The lack of VHF Band III spectrum by Danmarks Radio means that it is unlikely that the company will be able to offer FTA mobile TV via T-DMB alongside its digital radio content in the short to medium term.

Although there is interest in DVB-H in Denmark, the commercial TV sector is small and hence there is no obvious big player that may have the resources to invest in a DVB-H service. In any case, the frequencies are unlikely to become available until 2009. It is likely that Denmark will adopt the cautious approach of its Scandinavian neighbors and wait to see how the mobile TV market develops in other European countries and issues such as DVB-H spectrum harmonization and the future use of UHF band for mobile applications are resolved.

The Danish government has plans to auction L-band frequencies on a technology neutral basis and so these frequencies could be used for mobile TV. L-band is unlikely to be used for DVB-H

due to the interferences issues associated with concatenating three 1.712 MHz DAB channels into a single contiguous 5 MHz DVB-H channel. However, it is not clear whether there is any interest in using this spectrum for T-DMB either. No decisions have been made on the date of the auction or the license conditions.

There are plans to launch a pilot DVB-H service in Denmark with participation from the Technical University of Denmark, Danmarks Radio, the telecoms operators with vendor support from Nokia and Motorola.

No decision has been made by Danmarks Radio about participating in any commercial mobile TV ventures, and the current financial issues at Danmarks Radio means that the company will be unlikely to be a dominant investor or partner in any mobile TV network. However, as it is the principle broadcaster in Denmark, it will inevitably be a major content provider.

### **Finland**

Finland launched DVB-H pre-commercial service with free-to-air content in December 2006. The service has been hampered by a lack of appealing content.

The network provides around 25 percent population coverage in the three main cities of Helsinki, Oulu and Turku. Regulatory requirements call for coverage to be increased to 40 percent by the end of 2007. However, there are no further coverage requirements beyond this.

For the past year the platform has been operating with only limited content. A salient lesson to be learnt from Finland is that content rights is a major issue that needs to be addressed by DVB-H service providers. It is currently the biggest hurdle in Finland and impeding a full commercial launch of services. DVB-H in Finland will not progress until YLE's channels are on the platform.

The lack of a clear business model has also hurt the roll-out of DVB-H services as broadcasters have not been given sufficient incentive to make their services available on the platform. However, recent progress has been made towards finding a suitable business model based on the offer of pay services to viewers. These services can be distributed by a pay-operator who will serve as a content aggregator, sourcing content directly from broadcasters and other content producers, and will also purchase distribution capacity from the DVB-H network operator Digita.

All services are free-to-air at present and can only be received on two devices: the Nokia N77 and the Nokia N92. The cost of the N77 starts around €470 or is available for a monthly subscription rate of €22 per month from TeliaSonera. The Nokia N92 costs around €600.

The lack of content means that manufacturers are unwilling to offer DVB-H devices and mobile operators cannot market the service without content and devices. However, transmission company Digita has a 20-year license and it committed to the project.

### **France**

France has set aside a full national multiplex for DVB-H with 16 television channels and radio

services with up to 70-80 percent potential coverage prior to the November 2011 analogue switch-off.

Regulator CSA has launched a call for tender with a deadline of 15th January 2008 to award DVB-H licences to 13 television channels. The bids selected will be disclosed by April and licences awarded in June. All the major commercial broadcasters are expected to bid. Bidders are required to provide details on their plans for distribution, including the commercial model, and also whether broadcasts are free-to-air or encrypted. Public broadcasters will have three as yet unspecified channels. The broadcaster may use one each for France 2 and France 3, with the third split between France 5 and Arte

After the award of the licences, the licensees have two months to submit to the CSA an agreement to manage the multiplex, share transmission costs and award transmission contracts. Mobile operators could become shareholders in the multiplex company. If no agreement is reached by the licensees in the two-month window, licences will be invalidated

No agreement has been reached by channels and mobile operators on a business model. The major free-to-air broadcasters are ready to have their channels encrypted and distributed by mobile operators and over non-connected devices through the horizontal market. Canal+ envisages the direct distribution of an offer to consumers on non-connected devices, as well as a premium offer as part of the bouquet. A few smaller broadcasters want to be fully free-to-air.

Meanwhile, mobile operators want the full bouquet to be encrypted so that 1) they can subsidise handsets and 2) there is no risk, if as few as one or two channels were free-to-air, to have all channels follow suit, thus making it impossible to charge for the reception of DVB-H.

In any event a slow deployment is likely (CSA mandates 30 percent population 'outdoor' coverage within three years), as mobile operators will wait to face actual bandwidth constraints on the 3G networks which carry their existing mobile TV services.

The mandatory 30 percent coverage within 3 years is a minimum, and bidders are expected to present more aggressive deployment plans. All three mobile operators agree on the contrary on the need of a minimal critical mass of ca. 30 percent covered quickly to launch the service.

## **Germany**

The main focus of attention in Germany at present is the launch of mobile TV via DVB-H and there is sufficient spectrum available in the UHF band to launch one multiplex with nationwide coverage. However, it is possible that there may also be a free-to-air T-DMB service launched within the next two years, in addition to the already existing T-DMB service.

The Bundesnetzagentur (national spectrum regulator) issued a call for tender for frequencies for the operation of a nationwide DVB-H network in May 2007, and there were a total of three bids.

On the 15<sup>th</sup> October, it was announced that the winner is T-Systems Media&Broadcast GmbH. The company is planning to have the network operational in the Hannover region in time for the CeBIT 2008 exhibition. It is expected that the remaining fifteen capitals of the federal states plus

other major cities in Germany will be covered by the end of 2008.

In March 2007, the Landesmedienanstalten (LMA), or federal media regulators, issued a call for tender for the DVB-H platform operation and received two major bids: one from a consortium of mobile operators comprising T-Mobile, Vodafone Deutschland and O2 and the other from a joint venture known as Mobile 3.0 comprising Mobile Fernsehen Deutschland (MFD) and NEVA Media GmbH (financed by media companies Hubert Burda Media and Holtzbrinck Media. MFD is backed by Naspers/MIH, a major South African media and technology company.

On the 16th October, the LMA announced that its preferred bid was Mobile 3.0. Following a final decision by the media regulators, now not expected until January 2008, the Mobile 3.0 offer will need to be approved by the boards of each of the fourteen media regulators in Germany. Full commercial licenses for mobile TV services cannot be issued without a new national contract (e.g. between the federal states) which is under way. As a result, each individual regional state will issue "pilot" licenses to Mobile 3.0 which will vary from three to seven years depending on the region. This licensing process is not likely to be completed until mid 2008.

There is also interest in T-DMB mobile TV services in Germany. The first commercial T-DMB service in Europe was launched in Germany in May 2006 prior to the FIFA World Cup football tournament. Marketed under the brand name "Watcha" and operated by Mobiles Fernsehen Deutschland (MFD), the service uses L-band DAB network capacity leased from T-Systems Media&Broadcast and can be received in 16 major cities in Germany. The Watcha service offers 5 TV channels as well as all DAB radio stations available in Germany (see table page 47). The service is marketed by Debitel, Mobilecom and Simply Communications. MFD also markets the service directly via its own website. To date, the take-up of the service has been modest (around 10,000-15,000 subscribers). This is attributed mainly to the lack of marketing by mobile operators and a limited selection of mobile handsets.

Both the public and commercial broadcasters are planning to roll-out T-DMB mobile TV services from 2009 onwards. Mobile TV services are likely to be offered in conjunction with radio and other data services on the same multiplex rather than offered via a dedicated VHF T-DMB multiplex. Hence it is likely that these FTA services will compete with the DVB-H pay platform.

## **Greece**

Mobile TV is at a very early stage in Greece. There is some interest although there have not been any technical or commercial trials yet.

The priority at present is to continue with the roll-out of digital TV services via DVB-T. The process has started and there is currently one multiplex operated by the public broadcaster ERT. It covers around 60 percent of the population. A second multiplex is due to be launched in 2007.

The main interest in mobile TV is being shown by the broadcasters, particularly ERT, but it is unlikely that mobile TV via DVB-H or any other standards will gain traction until the digital TV licensing process has progressed further. The official date for analogue TV switch-off is 2012.

## **Ireland**

Regulator ComReg is prioritising, in terms of the allocation of frequencies, the launch of a national DVB-T platform over broadcast mobile television. DVB-T services were introduced on an experimental basis in Ireland only in 2006 and four fully fledged multiplexes are expected to launch in 2008. There are not enough frequencies available in Band III for a national TV bouquet before analogue switch-off.

Several mobile operators already distribute 3G-based TV bouquets in Ireland, and have substantial bandwidth available on their 3G networks to accommodate an increase in demand.

A DVB-H trial is under way since 2007 in Dublin and continues today. All market players appear to support DVB-H; MediaFLO has no backer yet.

Sufficient frequencies are already available for a broadcast mobile television multiplex covering major cities and ComReg will launch a consultation in early 2008, which could lead to the licensing of a multiplex – key players are the mobile operators and transmission companies. It appears that a licence would be issued to a multiplex operator, rather than on a channel-by-channel basis.

Much uncertainty remains over the business model for a broadcast mobile TV platform in Ireland, as in other European markets. Given the small size of the Irish market, mobile operators may wait and consider developments outside of Ireland before committing financial resources to a broadcast mobile TV platform.

## **Italy**

Italy launched two DVB-H multiplexes in 2006. In the same year three DVB-H platforms went on air: 3 TV from 3 Italia; TIM TV from Telecom Italia; and Vodafone Sky TV from Vodafone. Content is encrypted (with Nagravision) and exclusively accessible to each operator's subscribers.

3 Italia owns and operates its own national DVB-H multiplex. Telecom Italia and Vodafone lease bandwidth from the other DVB-H multiplex, operated by commercial broadcaster Mediaset, which cannot retail its own DVB-H bouquet or sell mobile-only advertising airtime under its antitrust undertakings.

Mediaset's major free-to-air channels are available on TIM TV and 3 TV, while public service broadcaster Rai's services are available only on 3 TV. The satellite pay-TV operator Sky Italia supplies basic thematic channels to all three platforms. Mediaset and Telecom Italia Media supply TIM TV and 3 TV with domestic football games. Adult content is also available.

The number of DVB-H handset models available on the Italian market is low, with just two to three models each from Samsung and LG. Nokia, who initially took issue with the conditional access solutions adopted by the three operators, will launch compatible models in 2008, and Motorola is also expected to supply the handset market. In a mobile consumer market driven by a rapid handset replacement cycle, the small number of models available and their high prices

are blamed for slow take up of DVB-H.

Without economies of scale being realised by manufacturers due to sufficiently strong global demand for DVB-H handsets, the price difference with other handsets could remain significant and a barrier to higher consumer take up.

Total DVB-H subscribers were about 800,000 in mid-2007: 3 Italia had over 700,000 TV subscribers in June 2007 thanks to a policy of heavily subsidising handsets and advertising on mainstream television; Telecom Italia and Vodafone had together less than 100,000 TV users, as they subsidise handsets only for their highest spending subscribers and are not publicising their services.

In late 2007, 3 Italia was shifting its publicity and advertising away from TV to web content access. 3 Italia also plans to use half of its multiplex for DTT from 2010. TIM was reviewing its approach and considering a shift in programming towards content re-purposed for mobile viewing.

Meanwhile, all three mobile operators with TV platforms are also actively deploying on-demand video services through their UMTS networks.

An alternative mobile TV platform using DAB/DMB could emerge in the medium term according to plans from broadcaster Rai and its transmission arm Raiway.

### **The Netherlands**

The Netherlands switched-off analogue terrestrial broadcasting in December 2006.

The incumbent telecom operator KPN has a uniquely strong position in broadcast mobile TV: It controls the national terrestrial TV transmission network and the Digitenne DTT platform with four national multiplexes while having the largest customer base of all mobile telephony operators. According to its 2001 licence, Digitenne is free to use part of its frequencies for mobile broadcast.

The Dutch government has taken a technology-neutral stand leaving KPN free to choose its standard for mobile TV broadcast. KPN has chosen DVB-H. The KPN DVB-H bouquet was planned for launch in late 2007 but this was postponed to 'before the 2008 Olympics', reportedly because of the need to secure a wider supply of compatible handset models. The bouquet will be available on a wholesale basis to third-party distributors.

Meanwhile, rival mobile telephony operators Vodafone and T-Mobile already retail mobile TV packages over 3G and KPN launched a trial 3G bouquet in September 2007. The commercial success or failure of the KPN bouquet will be an important indicator for a potential increase in the bandwidth devoted to DVB-H. If a failure, the emergence of rival platforms possibly using DAB/DMB is a possibility.

### **Norway**

The focus in Norway is on the launch of digital terrestrial TV at the present time and it is likely that Norway will adopt a "wait-and-see" strategy with respect to the roll-out of mobile TV

services via broadcast networks.

A major issue for Norway is the cost of rolling-out a dedicated DVB-H network. Norway is a sparsely populated and mountainous country with around 4.5 million inhabitants which means that it would be prohibitively expensive to build a nationwide network. A small population and high network costs means that it will be very difficult to create a viable business case in Norway. As a result, telecoms players such as Telenor are looking at the use of 3G/MBMS in conjunction with DVB-H.

Mobile TV in Norway could develop via a number of technologies. There is strong support for T-DMB from the public broadcaster while the telecoms industry favours the use of a combination of 3G, MBMS and DVB-H.

### **Portugal**

Although mobile TV services are offered on 3G networks, there are no immediate plans to launch mobile TV services via broadcast networks in Portugal.

There have been several technical trials and demonstrations in the country. In 2006, commercial broadcaster TV1 carried out a DVB-H trial with Vodafone Portugal in the greater Lisbon area. More recently, Alcatel-Lucent and Vodafone Portugal demonstrated DVB-SH technology using S-band frequencies. Channels broadcast included the Euronews channel (which was broadcast in several languages) plus content from RTP Mobile, SIC Channel and TVI Channel. DVB-SH handsets were provided by Sagem Mobiles.

RTP operates a DAB network in Portugal and although digital radio has stalled in the country since its launch in 1999, there is interest in using this network for mobile TV services via T-DMB. However, it remains to be seen whether there is sufficient political support for T-DMB within RTP as DVB-H is perceived as the preferred standard for mobile TV.

### **Spain**

Although DVB-H has been adopted as the de-facto standard for mobile TV, delays in passing new legislation by the Spanish parliament means that commercial services may not be launched until late 2008 or even 2009.

A technical plan will be published by the Ministry of Industry once the mobile TV legislation has been approved by the parliament. Then a call for tender for the network provider licenses will be issued. Finally, the regulatory conditions for content providers will be published. All these processes can be published without parliament approval.

A draft version of the technical plan has already been published which include the following proposals:

- Coverage: The government wants mobile TV to be rolled out in a 3 year period with deployment in several phases:
  - Phase 1: Cities with a population of more than 1 million (Madrid and Barcelona)

- Phase 2: Towns and cities with a population of more than 250,000
- Phase 3: All provincial capitals, autonomous cities and other autonomous community capitals of which there are 41 locations in Spain with a population between 225,000 and 30,000.

It is estimated that a DVB-H network covering Phases 1 and 2 would result in around 20-30 percent coverage of the Spanish population. However, some of the mobile network operators view DVB-H as a complement to their 3G networks and only wish to deploy DVB-H in the high density traffic areas rather than in the provincial capitals.

Spectrum for DVB-H will be limited to the major cities and provincial capitals until analogue TV is switched-off on the 3rd of April 2010.

- Content providers will be expected to pay transmission costs to the network operator although public broadcaster RTVE is lobbying the government to mandate that two or three of its channels should have “must-carry” status which probably means that RTVE will not be obliged to pay transmission costs.
- The DVB-H network license will be awarded by a beauty contest rather than an auction process.

## **Sweden**

Although all mobile operators in Sweden offer mobile TV services via their 3G networks, the launch of mobile TV services via a dedicated mobile broadcast networks seems a distant prospect at the present time and there are several options regarding the most appropriate technology platform.

A major issue in Sweden is the cost of rolling out a DVB-H network and whether it is possible to generate a return on the investment. A solution being proposed by Nokia is to build a hybrid DVB-T/DVB-H network whereby one part of the multiplex is used for DVB-T and another part is used for DVB-H. This may be a plausible solution in the future, but such a proposal seems unworkable under the current broadcasting legislation as public broadcaster SVT is obliged by law to provide its programming to 99.8 percent of the Swedish population.

The interest in using UHF spectrum for mobile TV via DVB-H among the broadcasting industry seems to have diminished recently. The broadcasters and the network operator Teracom believe that the spectrum should be used for fixed TV broadcasting (either SDTV or HDTV) rather than using exclusively for mobile TV via DVB-H or any other technology.

An option being proposed by SVT and supported by the public radio broadcaster Swedish Radio is to use VHF Band III frequencies for mobile TV and to reserve the UHF spectrum for fixed TV broadcasting. This would entail the use of Eureka-147-based mobile TV technologies such as T-DMB or an IP-based alternative such as DAB-IP.

There is also strong interest in using the digital dividend spectrum for mobile applications, in

particular, via MBMS. Ericsson, a major Swedish company, is a leading player in this market and there is support for the view that the government's industrial policy should support Swedish companies and Swedish technologies. However, the interest is probably for the long-term as no mobile vendors (with the exception of DVB-H hardware vendors) currently manufacture equipment for UHF frequencies.

It is likely that the government may adopt the same strategy it adopted with digital radio and decide to postpone a decision on mobile TV and the use of the digital dividend spectrum until it becomes clearer how the mobile TV is developing in other European countries and the issues regarding spectrum harmonization (particularly for mobile applications) across Europe have been resolved.

### **Switzerland**

It is likely that there will be two mobile TV services in Switzerland: one a pay or subscription service controlled by the mobile industry and targeted at mobile phone devices and the other a free-to-air service controlled by broadcasters and targeted (initially at least) at non-phone devices.

A call for tender for a national mobile TV license using the first multiplex was launched by the Swiss Federal Office of Communications (ComCom) on the 5th June 2007. Two candidates submitted bids: Mobile TV Schweiz AG (with partners T-Systems Media & Broadcast GmbH and South Korea Telecom) and Swisscom Broadcast AG, a subsidiary of the incumbent telecommunications provider Swisscom.

The bids were evaluated on a beauty contest basis and the criteria used included coverage and rollout schedules, business and service plan, contribution to media diversity, compliance with license conditions, legal requirements and financial credibility. On the 28th September, it was announced that the winning bid was Swisscom Broadcast.

The license will be for ten years and Swisscom Broadcast will be required to comply with a number of license conditions:

- Network coverage: In its call for tender, the regulator stipulated that the network operator should provide at least 30 percent network coverage by the end of May 2008 (including Euro 2008 host cities Basel, Berne, Geneva and Zurich) and at least 50 percent by the end of 2012. However, Swisscom Broadcast proposed to provide 44 percent population coverage by the end of May 2008 and approximately 60 percent by the end of 2012
- Technical standards - although the call for tender did not specify that a specific technical standard should be used, the regulator favors DVB-H and Swisscom Broadcast proposed to adopt this standard
- Unlike many other countries, there are no "must-carry" obligations for broadcasters. However, Swisscom Broadcast is obliged to provide "all TV broadcasters and

telecommunications providers with equal access to the platform under equitable and non-discriminatory conditions in accordance with article 51 of the Law on Radio and Television.”

With the Euro 2008 football tournament being held jointly by Austria and Switzerland in June 2008, the Swiss authorities have embarked on an ambitious plan to launch commercial DVB-H services prior to the tournament. Despite the political goodwill among market players, launching commercial DVB-H services in time for the Euro 2008 will be a challenge.

### **United Kingdom**

Mobile TV services are available over 3G from four of the UK's five mobile network operators, with channel package pricing ranging from £3 to £10 a month, although there has been limited reporting of the success of these services to date.

Broadcast mobile TV services were launched by BT Movio in October 2006, operating using DAB-IP technology in VHF Band III spectrum. However, the service has not managed to attract significant customer numbers or sufficient interest from the mobile operators, and it is due to close at the start of 2008. All of the four front-running technology contenders, DAB, DVB-H, MediaFLO and TDtv have been tested in trials in the UK.

Ofcom, the UK regulator, is currently pursuing a technology neutral approach to spectrum licensing, and hence no spectrum will be set aside specifically for mobile TV. Furthermore, the European Commission's attempt to centralise mobile TV broadcasting standards around DVB-H conflicts with Ofcom's position of technology neutrality, and currently any of the principal technologies could be used in the UK. Spectrum allocation will be through auctions, with L-Band spectrum due to be auctioned in H1 2008 and UHF spectrum from the digital dividend now likely to be auctioned in early 2009. Before 2012, there are only limited options for a mobile TV network in the UK, with Channel 36 in the UHF band and the L-Band the main contenders, while TDD and VHF spectrum remain outside possibilities

The prospects for broadcast mobile TV in the UK remain uncertain, as none of the main players in the UK has yet committed to running a platform, and competition for spectrum from other technologies such as WiMAX means there is no guarantee that spectrum will be available. Evidence of consumer demand for paid services has yet to be demonstrated, with the BT Movio service failing to garner sufficient interest. However, Sky is having some success with its premium packaged content.

Most industry players believe that broadcast mobile TV services are likely to be launched in the UK in the next few years, with the most likely scenario seen as a single platform operator using a content aggregation model and offering wholesale services to mobile operators.

### **Non-European markets**

#### **South Korea**

There are two competing mobile TV services in South Korea: a free-to-air T-DMB service

operated by the broadcasters and a competing S-DMB pay-service operated and marketed by the main mobile operator SK Telecom. Although South Korea is often cited as a success story for mobile TV, none of the Korean broadcast services seem to be profitable and handset sales appear to be driven by applications other than broadcast services.

There are six T-DMB broadcasters in South Korea: three incumbent terrestrial broadcasters (KBS, MBC and SBS) and three new service providers (YTN DMB, U1 Media and KMMB). They offer a total of seven TV channels on six multiplexes. Each multiplex typically carries one video channel broadcasting at a data rate of between 512- 544 kbps per channel. The licenses have been granted for a whole multiplex and broadcasters are able to offer any mix of service – TV, radio or data services

There is strong competition between T-DMB and S-DMB in South Korea. After SK Telecom launched its S-DMB service via TU Media in May 2005, LG Telecom and KTF (the second and third largest mobile operators) started marketing T-DMB services with the help of broadcasters such as KBS and SBS.

A surprisingly large proportion of T-DMB devices – approximately 40 percent – are car navigation devices, equalling the number of T-DMB mobile phone devices sold. In contrast, the majority of S-DMB devices - around or 96 percent - are mobile TV phones with only a small proportion being car navigation devices.

In early 2007, devices permitting unidirectional services based on TPEG, Broadcast Web Sites (BWS) and Slide Show (SLD) became available and several broadcasters have started offering these services. Consumers are obliged to buy a TPEG device and pay a one-off fee (approximately \$100) to a broadcaster which provides them with a lifetime access to the services. Although the TPEG data signal is not encrypted, consumers must decide which service provider they prefer when they purchase a terminal, as for example, a KBS TPEG terminal cannot access MBC TPEG services and vice versa. TTI services via TPEG are widely regarded as a killer application in South Korea and are boosting the sales of T-DMB car navigation devices.

## **China**

The Chinese market is very complex due mainly to the number of competing mobile TV standards, several of which are backed by different regulatory bodies. As a result, it is difficult to predict how the market will develop. However, the Chinese authorities are keen to showcase mobile TV technology to the world during the Olympic Games in 2008 and this could well be a major catalyst for mobile TV in the country.

There are a number of mobile TV standards, both domestic and international, being proposed for the Chinese market.

- CMMB – or China Mobile Multimedia Broadcasting is the new commercial name for the main national Chinese mobile TV standard. Also known by its technical acronym STiMi (Satellite and Terrestrial Interactive Multimedia Infrastructure), it was developed by the

Academy of Broadcast Sciences and operates at VHF and UHF frequencies for terrestrial broadcasting and S-band for satellite broadcasting.

- DMB-TH – or Digital Multimedia Broadcasting Terrestrial/Handheld is a handheld version of DMB-T, which is one of the standards used in China's new fixed digital TV standard.
- T-MMB – or Terrestrial Mobile Multimedia Broadcasting is being developed by Nufrontsoft (a Beijing software company), the Communications University of China and Southeast University. This is based on the Eureka-147 DAB standard.
- T-DMB – is also allowed in conjunction with DAB for audio but only for FTA services. However, retailers are not yet allowed to sell T-DMB mobile phones.

CMMB has already been approved as a national standard but it remains to be seen which of the others will achieve the same status. At present, a key issue for the Chinese government is whether these standards will be available commercially in time for the 2008 Olympic Games. At IBC 2007, SARFT officials insisted that CMMB was on schedule and claimed that the first CMMB chipset had been developed by a Chinese company called Innofidei. SARFT expects to have pre-commercial mobile TV services based on CMMB in six Chinese cities by the end of 2007 and to launch two satellites in Spring 2008. CMMB based mobile TV services will be available in 60 cities before the Olympics according to SARFT.

### **United States**

In the United States Qualcomm has developed a proprietary broadcasting standard, MediaFLO<sup>2</sup> that operates exclusively in the 700 MHz frequency spectrum and the company has nationwide rights to use this frequency band. Qualcomm expects to spend \$800 million to build out its entire nationwide network.

The company is expected to have less than half a million subscribers by the end of 2007 through its deal with Verizon. The service is known as VCast and offers 8 channels in 32 major markets in the US. Subscription rates range from \$13 to \$15 per month. Qualcomm is reaching out to other operators and secured a launch on AT&T's network, however, this has been postponed into early 2008.

In the US, the market is divided between MediaFLO and services like MobiTV, a TV service over existing mobile networks. Competition on exiting networks is also coming from a company called Alltel which launched its Mywaves service in July 2007, offering a wide variety of pre-recorded niche content charging about \$4 per month. The company claims over one million subscribers.

The DVB-H venture Modeo, a subsidiary of network operator Crown Castle, was shut down in summer 2007. Modeo failed to find partners willing to back the project and distribute the service.

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<sup>2</sup> Forward Link Only

# Conclusions

Mobile network operators have already been delivering video to mobile phone users for several years across European markets using existing cellular technologies. Broadcast solutions have emerged because of the inevitable capacity limits of UMTS networks; the need for mobile operators for differentiation and value added services in a highly competitive environment; and the widespread belief that consumer demand for broadcast services will grow.

So far, the growth of mobile broadcast television services in Europe has been tepid and the its real potential is still unknown. Slow development is the result of a shortage of spectrum in many key markets (e.g. UK); a lack of consensus on business models (e.g. Finland); and difficulties in many countries in establishing the regulatory framework needed to launch (e.g. Spain).

The most advanced market in Europe is Italy which launched full commercial services in 2006 and now has approximately 800,000 DVB-H subscribers, although its success may be questioned. The UK and Germany also have launched services with very little success, together accounting for several tens of thousands of mobile viewers. This may be due to the limited service offering provided to viewers.

Scenario for Mobile Broadcast Television in Europe (DVB-H)

Market drivers	2008	2009	2010	2011	2012	2013	2014	2015
<b>New commercial launches</b>								
Austria, Switzerland, Finland, France, Netherlands, Germany								
Spain								
Others								
<b>Content drivers</b>								
More channels launched on existing capacity								
UEFA European Football Championship								
Olympics/ World Cup								
Mobile copyright issues resolved								

Other factors influencing the services
<b>Network coverage/Spectrum availability</b>
Coverage reaches beyond large population centres
New spectrum becomes available (e.g. by ASO)
3G networks reach limits
<b>Consumer demand</b>
Interactive applications develop with use of telecom return channel
Handset prices decline substantially
Greater competitiveness and consumer choice in the handsets offered in the majority of markets
<b>Technology</b>
Future development of second generation DVB-H
Improved displays/power/local storage
<b>Business models</b>
Evolution of initial market launch models
Potential development of free-to-air advertising models

Several key markets are expected to launch services in 2008, including Austria, Finland, France, Germany (DVB-H), the Netherlands, and Switzerland. Spain will wait until 2009 to launch its mobile TV services given the delays to the regulatory regime caused by the upcoming elections.

Apart from Finland, the Nordics are more in a wait-and-see mode while smaller markets, like Greece and Portugal, and countries in central and eastern Europe may move forward if results in other markets prove positive.

The high profile launches in 2008 may encourage a period of optimism. However, a steady growth of subscribers will be necessary to prevent stagnation until 2012-2015 when certain key drivers and other factors influencing the services kick in (see charts above). While it will be possible to deploy a successful mobile television offer, a mass market potential will be difficult to achieve until significant swathes of spectrum become available.

Meanwhile, lessons can be learned from beyond Europe. In Asia, mobile television has proven to be successful with 10 million users in Japan and 7 million users in Korea. While this is due in part to the offer of free-to-air television services, the offer of such applications as traffic information has also proven popular with users.

The United States remains in early stages of development with total mobile broadcast service subscribers less than half a million. Overall in the US, only five million of the 220 million mobile users subscribe to a mobile television or video service.

### **The subscription-based model is the clearly emerging business model**

To the extent mixed models develop only the subscription segment will contribute any significant revenue in the medium term. In most currently launched platforms as well as impending launches, most generalist broadcasters have initially accepted the requirement of a subscription model although some would prefer a free-to-air model in the long-run. It is likely that any pay-model would be based on several tiers, including a basic subscription package for a small access fee supplemented by premium services. However, the penetration of mobile television receivers embedded in mobile phones could provide generalist broadcasters and advertisers with a sufficient market to allow for the launch of free-to-air services, perhaps sooner than expected.

### **Coverage will depend on spectrum availability**

In most countries launching mobile television services, coverage planning is for less than 50 percent of the population. For example in Finland, current coverage reaches 30 percent of the population and will increase to 40 percent by spring 2008. In France, 30 percent population coverage will be reached only 3 years after launch as required by the broadcast regulator although candidates are encouraged to commit to higher coverage figures. Current plans aim at covering over 50 percent of the population by 2011.

Exceptions include Italy which has a population coverage of 60 percent for DVB-H services. In

Germany, the network operator has agreed to cover 80 percent of the population by mid 2010, once analogue switch-off has been completed. Services will be launched in several countries and achieve large scale significance well before analogue switch off is completed, nevertheless services in some countries will not achieve high capacity and population reach until ASO makes sufficient spectrum available.

Analogue Switch-Off (ASO) timeline for analogue television

	Official target	Expected range
<b>Fast track</b>		
Finland	2007	<b>2006-2008</b>
Sweden	2007	
Netherlands	2006	
Germany	2008	
Switzerland	2008	
<b>Middle term</b>		
Belgium	2011	<b>2009-2012</b>
Norway	2010	
Denmark	2009	
Austria	2010	
Ireland	2012	
<b>Last</b>		
Italy	2012	<b>2012-2015</b>
UK	2012	
France	2011	
Spain	2010	
Portugal	2012	
Greece	2012	

### Mobile network operators continue to advance their multimedia offers

Most mobile phone operators have implemented 3G television services on their networks with a wide variety of pricing schemes. They continue to develop content, roll-out services, and refine business models. In this context, broadcast mobile TV will only be one element in a very competitive market for mobile content which now is dominated by games and music. At the same time, wireless network improvements like HSDPA and MBMS will alleviate to some extent the unicast constraints on those networks and allow for some expansion of usage.

### Consumer demand for mobile broadcast TV needs further confirmation

Early trials in Finland, Berlin, and then in the UK, Spain, and France in 2005/06 were encouraging to operators. Willingness to pay ranged from 40 to 75 percent, satisfaction was high, and daily viewing averaged about 20 minutes. However, these results seem to have been extrapolated by many into the general and universal belief that most people wanted to watch TV on mobile devices and were willing to pay for the service.

Recent studies are not as encouraging. In a Gartner study of European consumers published in

September 2007, mobile television and video downloads ranked close to the bottom of consumer interest: 95 percent of Europeans expressed no interest in watching television or video on their mobile phones in the coming year. In the UK, new research from BMRB showed that more than half never watched a video clip or downloaded music, and 75 percent said they were unwilling to pay even £5 a month for mobile TV services. InStat, in the US, conducted a survey of 1000 potential users and found that less than 7 percent would pay \$15 per month for television services.

Willingness of mobile customers to pay will be dependent on the amount of the service access fee. If drawing the parallel with other pay-TV services in Europe is valid, then the development of cable and satellite pay TV in Europe may teach us that penetration rates will remain low and grow to either a natural ceiling or a limit above which growth will be extremely slow.

Moreover, the type of content that has been successful on pay TV is very specific and may include exclusive content, primarily sports and films and also thematic channel packages. With mobile television, feature length films are unlikely to be consumed by mobile customers, leaving the implication that sports and news are likely to be the key drivers, while a bouquet of premium thematic channels represent the content that can boost the chances for pay mobile broadcast television. Audience data released by 3 Italia tend to confirm this pattern of usage.

Looking forward, a mass market can only develop when content is widespread, most of the population is covered, and consumer equipment passes beneath a certain lower price point, if it is not subsidised by service operators (mobile telecom operators and/or pay-TV operators).

### **Public Service Broadcasters will be key players**

Public Service Broadcasters (PSBs) are involved in content provision and to some extent in all key launch plans. The notable exception is YLE in Finland where copyright issues have hampered the broadcaster's ability to join the platform.

PSBs have experimented with offering their content on 3G networks in an effort to reach their audiences. For example, the BBC has provided a range of TV channels to the 3G networks of Orange, Vodafone and 3. Copyright-cleared content from BBC1, BBC News 24 and BBC Three has been made available for syndication. Projects like these have helped to develop the BBC's future mobile strategy.

PSBs (excluding those that run a network business) do not necessarily have a vested interest in a mobile TV platform. The situation is not the same as with the Digital Terrestrial Television (DTT) platform, for example, when their core business was at stake and they did drive the whole process forward from technical testing, to content provision, and coverage expansion. The success of DTT today is in large measure attributable to public service broadcasters. Their involvement also persuaded many governments to provide the financial support that was necessary in many cases. If mobile broadcast TV is not viewed as a public project, support like this may be less forthcoming.

The role of PSBs in mobile TV will in most cases be that of content providers to commercial platforms. PSBs are expected to manage this relationship in much the same way as they have with pay cable and satellite bouquets.

Therefore, until a free-to-air mass market develops, the imperatives for PSBs will be to monitor developments and try to ensure a conducive regulatory environment for the future. Beyond this, it will be important to focus on the content side for all mobile platforms: repurposing programmes and channels, developing applications, providing on-demand services etc.

Broadcasters may face - either competitively or cooperatively - a new type of content player emerging in the mobile broadcast industry. The audio and video constraints of mobile transmission technology require specialized production skills. Short-form, made-for-mobile content producers and aggregators are developing strong businesses with mobile network operators to meet this need. For example, in the US companies like MobiTV and GoTV provide packages of tailored TV content to mobile networks. Although major carriers have been acquiring rights directly from broadcasters, producers, and sports rights agencies, the short-form producers/aggregators are now offering a vast array of ready-made content that is a better fit to the mobile medium.

However, as long as viewers consider mobile television as a true 'television' service, broadcasters will have a key role in providing content. Their skills in generating content combined with their strong brand appeal will be essential in the provision of mobile television services.



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# Introduction

## Overview

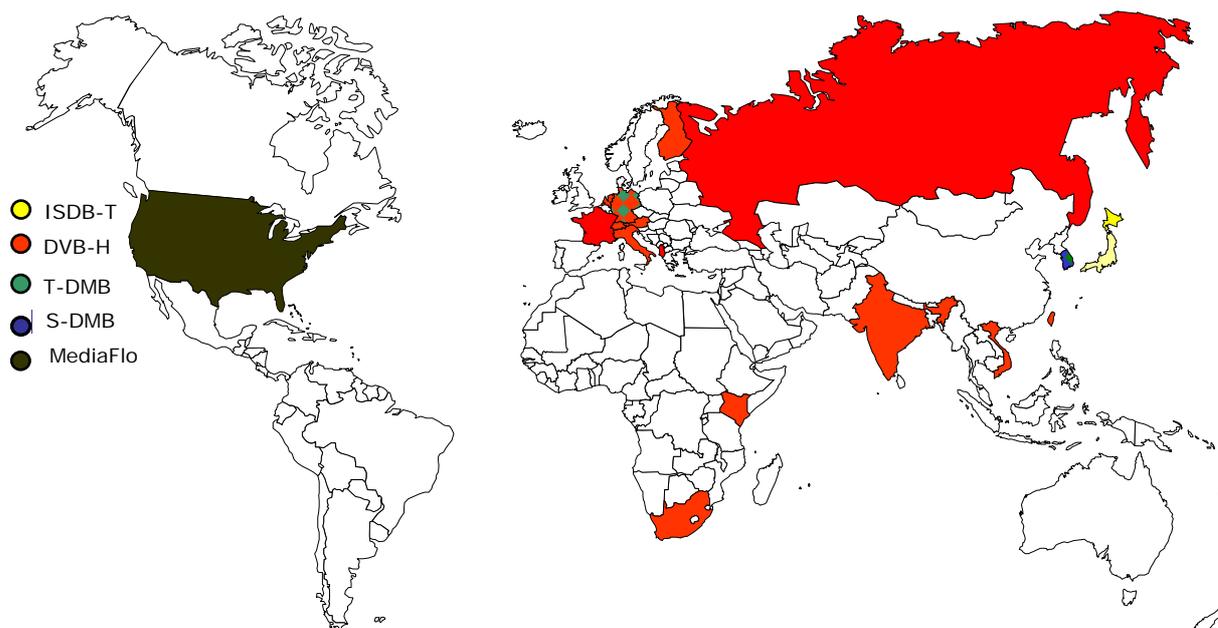
This report covers the major western European markets and is based primarily on interviews with experts and key players in the industry including broadcasters, network operators, and regulators. Primary research was conducted from August through November of 2007. All efforts have been made to ensure that information is current as of November 2007. The EBU and DigiTAG do not necessarily endorse the opinions, analysis, or forward-looking statements contained in this report.

The focus of the report is broadcast mobile television rather than the currently widespread unicast solutions offered by most mobile phone operators. The distinction is crucial for broadcasters and broadcast network operators because the investment, production, and demand aspects of broadcast technologies are very different, as the report will show.

## Global standards available

A number of different standards have been developed to provide television services to a handheld device. Mobile telecom operators can provide services using their UMTS networks with such technologies as High-Speed Downlink Packet Access (HSDPA), Multimedia Broadcast Multicast Service (MBMS) as well as TDtv and EDGE. However, these technologies are constrained by the capacity of the unicast network, although developments like HSDPA and MBMS will alleviate to some extent these constraints.

Several broadcast technologies are currently available to provide live television services. Digital Multimedia Broadcast (DMB) delivers mobile television services based on the Eureka-147 Digital Audio Broadcast (DAB) standard with additional error-correction. DAB-IP is one variant to DMB. Integrated Services Digital Broadcasting (ISDB-T), developed by Japan as its proprietary digital terrestrial television standard, provides some modes which are suitable for broadcasting for handheld reception. Two further technologies which have proven successful are MediaFLO in the United States, developed by Qualcomm, and Digital Video Broadcasting on Handhelds (DVB-H), developed by the DVB Project.



There is a clear tendency of regionalization of technology standards for broadcast mobile television. In Europe, the European Commission is favouring DVB-H using primarily the economies-of-scale argument in the hopes of replicating the success of GSM and prompting widespread adoption. In the United States, regulators have not encouraged any particular standard and with the closure of Crown Castle's Modeo DVB-H project, MediaFLO has been left as the de facto US standard. In Asia, DMB variants are predominant except for Japan with its own national solution, ISDB-T. However, different standards are crossing borders in some cases. DVB-H has been launched in Vietnam, India, Nigeria, and The Philippines. MediaFLO has been working with BSkyB and other pay operators to establish a foothold in Europe. In the long run, it may be that more than one standard is taken up in a particular market depending on spectrum availability and other issues.

### **Spectrum issues and results of the WRC-07**

The World Radiocommunication Conference 2007 (WRC-07) met in Geneva from 22 October until 16 November to discuss the worldwide use of radio frequencies and modify as necessary the Radio Regulations, the international framework governing the use of frequency spectrum and satellite orbits. The Conference brought together 164 national administrations from around the world, with countries divided into regions representing Europe, the Middle East and Africa (Region 1), the Americas (Region 2), and Russia and Asia Pacific (Region 3).

A key issue for broadcasters concerned the allocation of mobile telecom services in the terrestrial frequency bands between 470-862 MHz traditionally reserved for broadcasting. Some countries had requested that mobile services be given co-primary status alongside broadcasting in these bands.

## Spectrum and digital systems

Band	Frequencies	Analogue systems	Digital systems
Band II	87.5-108 MHz	FM radio	(DRM+)
Band III	174-230 MHz	TV	DAB/DMB, DVB-T
Band IV/V	470-862 MHz	TV	DVB-T/H
Band L	1452-1492 MHz	-	DAB/DMB/(DVB-H?)

Source: EBU<sup>1</sup>

For countries in Europe, the question raised heated debate with a common position only possible after a marathon-long discussion session. The final agreement allows for mobile telecom services to be proposed as "primary services" in the frequency bands between 790-862 MHz only from 17 June 2015. This date corresponds to the end of the analogue/digital broadcast transition period for Region 1 and Iran as established in the Geneva 2006 (GE-06) Agreement.

However, not all countries agreed with this compromise. Because the introduction of mobile services in the frequencies between 790-862 MHz is generally delayed until June 2015, 65 countries decided in two footnotes (5.316 and 5.316A) to make these frequencies available for mobile services immediately.

In Europe, these countries include Bosnia and Herzegovina, Croatia, Denmark, Finland, France, Germany, Greece, Lithuania, FYR Macedonia, Montenegro, Norway, the Netherlands, Poland, Portugal, Serbia, Sweden and Switzerland and the United Kingdom. Three countries - Lithuania, Malta and Spain - allow for their early mobile service usage but only within a limited frequency range, from 830-862 MHz.

In both of these exceptions added to the Radio Regulations, it was noted that "*stations of the mobile services .... shall not cause harmful interference to, or claim protection from, stations of services operating in accordance with the Table...*" This means that broadcast services in neighbouring countries must be given protection against interference from mobile services. In the case of Poland and Lithuania, protection must also be guaranteed for the aeronautical mobile services of neighbouring countries (i.e. Russia).

It should be noted that within the mobile service allocation, international mobile telecommunication (IMT) services have been identified as one of the possible uses. IMT services includes both IMT 2000 (3G technologies, UMTS, CDMA 2000, WiMAX) as well as IMT advanced services (4G). At the WRC-07, national administrations decided to merge IMT 2000 and IMT advanced services into a single category.

While broadcasters had requested that their status as the unique primary service in the VHF and UHF frequency bands remain unchanged, they will now need to face the possibility that mobile services may be introduced in the upper parts of the UHF band.

Several reasons have guided this decision by national administrations. First, national

<sup>1</sup> All charts are based on EBU sources and EBU commissioned research

administrations have made the assumption that the switch of broadcasting from analogue to digital will make it possible to free-up frequencies for new services, including mobile services. Thus, it is necessary to allow such services to be given access to the bands. Second, national administrations may be coveting the potential revenue that may be generated by an auction for these frequencies. It is estimated that the auction of frequencies in the 698-806 MHz in the United States will bring the government up to \$15 billion.

Finally, some national administrations wish to align themselves with the position of the European Commission which has called for the introduction of new rules to govern spectrum policy. In its proposed "Telecom Package" issued on 13 November, the Commission advocates the principle of "service neutrality" in which the type of service provided within a given frequency band is not established by policy but rather by the market. Allowing for mobile services in the UHF band provides some freeing up of constraints in the types of services that can be offered.

However, planning for the introduction of IMT (mobile) services will not be easy. In some countries, such as Spain, the bands that allow for the introduction of IMT services are currently used extensively by broadcasters for the provision of their DTT services. Making changes to the transmission network to move the current broadcast services will entail major costs, to which will be added the costs for the provision of the new IMT service transmission network.

The issue of interference will also need to be addressed. While the WRC-07 makes it clear that the allotments established in GE-06 must be respected, with services not causing more interference or requiring more protection than agreed, it will be important to ensure that broadcast services are not harmed by mobile services, particularly 'uplink' services. Some have suggested that the use of a harmonised frequency band for mobile services with guard bands on each end to protect broadcast services may be one solution. However, the allocation of such a harmonised band contradicts the Commission principle of "service neutrality" while the use of guard bands sterilizes spectrum bandwidth.

Ultimately, national administrations have provided themselves with the legal framework to provide more flexibility in the allocation of frequencies. It is possible that mobile services can be introduced in the broadcast bands, however, this will be very difficult prior to analogue switch-off and will require careful planning to avoid interference with broadcast services.

### **The role of the European Commission**

At the end of November 2007, the Council of telecommunications ministers of the European Union affirmed Commissioner Reding's call for the adoption of DVB-H as the single European standard for mobile broadcast television on a non-compulsory basis. The Council generally supported the position put forcefully in March 2007:

*"My assessment is that we are too slow and too uncoordinated to create the right conditions for a quick take-up of mobile TV on a large scale in Europe...I had asked industry in particular to address issues related to technology. The challenge is the following: providing technological solutions that are best suited to ensure the availability*

*of mobile TV anytime and everywhere, including at home, and making technological choices that allow attractive commercial offers. European industry, supported also by EU-funded research, is largely behind the technologies being used today to launch mobile TV services in the world. I therefore expected from EMBC clear answers on how to best deal with this challenge. I find the recommendations in the EMBC report too consensual. What we really need now is to decide and draft a European strategy for a swift and large take-up of mobile TV in Europe.*

*I am convinced that the use of widely recognised open standards is of paramount importance to achieve economies of scale. Only with economies of scale will we have an efficient use of spectrum, affordable handsets and rapid consumer take-up. Therefore, I am prepared to give strong support to European standardised solutions, such as DVB-H, on the condition that they provide certainty about technology licensing terms and conditions. Without this certainty and predictability, it will be impossible to invest with confidence in new innovative technologies. Industry should therefore foster work in this direction." - Viviane Reding, Hannover, Germany, 16 March 2007*

Since this statement was made it has come under attack by many industry experts. Many MEPs, especially from Germany, Britain and the Netherlands, have also expressed disagreement.

Many objected under the general rubric of "let the market decide", but specific arguments were made as well:

- In early stages of market development, competing standards often lead to greater innovation and encourage improvement in each technology as it vies against each other.
- Different standards often can be used in different frequency bands offering more flexibility of deployment depending on the national frequency situation in a particular country.
- Mandating DVB-H will not solve the problem of operators implementing different encryption systems.

At a more fundamental level, regulating a market that does not exist is always a tricky business. Sometimes similar markets can be used for guidance, however, the very nascent broadcast TV mobile resembles neither the GSM market nor the digital broadcast TV market.

The Commission wishes to encourage economies of scale to drive mobile TV. However, economies of scale need to be reached on a global scale in order for handset manufacturers to realize significant unit production savings. Driving competing technologies out of Europe forces their proponents to accelerate their efforts in other markets, particularly Asia. This may lead to regional division of standards and a counterproductive result . Most importantly, the mobile TV

market has not proliferated, not because of lack of standards, but rather because of unclear business models, limited spectrum, and questionable consumer demand.

In September, the German Federal Council (Bundesrat) decided there should be no mandatory standard for mobile TV and explicitly disagreed with the Commission's DVB-H policy. The Council went on to say that it could interfere with media pluralism and cultural diversity. Any moves to make the standard mandatory next year will likely face strong opposition.

## **Country summaries**

### **Western European markets**

#### **Austria**

Austria has decided to commit to the DVB-H standard and the regulator has initiated a call to tender for the network license. The key driver behind the launch of DVB-H services in Austria is the forthcoming Euro 2008 football tournament which will be jointly held by Austria and Switzerland in mid-2008.

A new broadcasting law was passed on the 1st August 2007 by the Austrian parliament which defined the DVB-H licensing process. The law also amends a number of existing broadcasting laws. For example, the public broadcaster ORF is permitted to make a number of "made-for-mobile" channels.

On the 14th September 2007, the regulator RTR launched a call for tender for the DVB-H network provider license. Potential bidders include the dominant broadcast network operator ORS, which is owned by the public broadcaster ORF, and mobile operators such as Mobilekom and One. The original deadline for bids was the 16th November. However, following calls for this deadline to be extended, the regulator has set a new date for receiving applications which is the 14th December 2007.

Coverage – fast roll-out and extensive population coverage will one of the key criteria evaluated by the regulator. The minimum network coverage should be 50 percent one year after the license is awarded. However, applicants will be expected to propose their own roll-out and coverage schedules and these proposals will be binding on the winning applicant.

Content aggregation - the network license holder will not be allowed to select the content on the multiplex. This will be done by content aggregators, in effect the mobile network operators (MNO), of which there are four in Austria. Each network license applicant will be required to include content packages created by the operators in the bid. A bidder could have content from all carriers or only two or three MNOs. It is possible that two bids could have exactly the same content.

With network licenses not likely to be granted until January 2008, the schedule for the launch for services is likely to be very tight and there will need to be a great deal of goodwill between the various market players to resolve copyright and other conflicts in time for the start of the Euro 2008 tournament.

## Belgium

The French-speaking community published its strategic plan for digital transition (PSTN) in July 2007. Currently the Community has available seven channels for TV broadcasting in the Bands IV and V. One is used for DTT, five for analogue transmissions and one is free. After switch-off all seven multiplexes (one SFN and six MFNs) will be devoted to television broadcast, but the amount of bandwidth eventually devoted to DVB-H has not been decided yet.

Meanwhile the channel currently free is to host a DVB-H multiplex from 2008, half of which has been licensed to the public broadcaster RTBF by the government and half is to be licensed to other providers through a call for tender. The licences will last nine years. In Band III the Community will have three T-DAB multiplexes, yet to be licensed.

Existing regulation states that the DVB-H call for tender should be aimed at network operators and, following a public consultation, the Community government wants to change the rule in order to licence channels instead. The changes should be made by a decree prior to the tender. The decree should also set the terms for the contractual relationship between RTBF and other multiplex licensees.

In the Flanders a two-year DVB-H trial started in 2006 after which a commercial DVB-H multiplex could be licensed. Public broadcaster VRT has taken an active role in developing mobile TV content, notably with re-purposed news bulletins and a fiction series edited for short episodes (or 'mobisodes') to be viewed on mobile. VRT is in a DVB-H trial partnership with the incumbent telecom operator Belgacom and its Proximus mobile division, the cable operator Telenet, Siemens, Scientific Atlanta and academic research centres. The two-year trial started in 2006. RTBF has announced in 2007 that it plans to start a pilot DVB-H bouquet of up to eight channels in the Brussels region, also in partnership with Proximus. Proximus launched a free 3G mobile TV service for its subscribers in 2005 and started charging in early 2007.

## Denmark

There is interest in mobile TV in Denmark although the various players are very cautious about committing resources to develop such services.

At the present time, it is not clear how mobile TV will develop in Denmark. The lack of VHF Band III spectrum by Danmarks Radio means that it is unlikely that the company will be able to offer FTA mobile TV via T-DMB alongside its digital radio content in the short to medium term.

Although there is interest in DVB-H in Denmark, the commercial TV sector is small and hence there is no obvious big player that may have the resources to invest in a DVB-H service. In any case, the frequencies are unlikely to become available until 2009. It is likely that Denmark will adopt the cautious approach of its Scandinavian neighbors and wait to see how the mobile TV market develops in other European countries and issues such as DVB-H spectrum harmonization and the future use of UHF band for mobile applications are resolved.

The Danish government has plans to auction L-band frequencies on a technology neutral basis and so these frequencies could be used for mobile TV. L-band is unlikely to be used for DVB-H

due to the interferences issues associated with concatenating three 1.712 MHz DAB channels into a single contiguous 5 MHz DVB-H channel. However, it is not clear whether there is any interest in using this spectrum for T-DMB either. No decisions have been made on the date of the auction or the license conditions.

There are plans to launch a pilot DVB-H service in Denmark with participation from the Technical University of Denmark, Danmarks Radio, the telecoms operators with vendor support from Nokia and Motorola.

No decision has been made by Danmarks Radio about participating in any commercial mobile TV ventures, and the current financial issues at Danmarks Radio means that the company will be unlikely to be a dominant investor or partner in any mobile TV network. However, as it is the principle broadcaster in Denmark, it will inevitably be a major content provider.

### **Finland**

Finland launched DVB-H pre-commercial service with free-to-air content in December 2006. The service has been hampered by a lack of appealing content.

The network provides around 25 percent population coverage in the three main cities of Helsinki, Oulu and Turku. Regulatory requirements call for coverage to be increased to 40 percent by the end of 2007. However, there are no further coverage requirements beyond this.

For the past year the platform has been operating with only limited content. A salient lesson to be learnt from Finland is that content rights is a major issue that needs to be addressed by DVB-H service providers. It is currently the biggest hurdle in Finland and impeding a full commercial launch of services. DVB-H in Finland will not progress until YLE's channels are on the platform.

The lack of a clear business model has also hurt the roll-out of DVB-H services as broadcasters have not been given sufficient incentive to make their services available on the platform. However, recent progress has been made towards finding a suitable business model based on the offer of pay services to viewers. These services can be distributed by a pay-operator who will serve as a content aggregator, sourcing content directly from broadcasters and other content producers, and will also purchase distribution capacity from the DVB-H network operator Digita.

All services are free-to-air at present and can only be received on two devices: the Nokia N77 and the Nokia N92. The cost of the N77 starts around €470 or is available for a monthly subscription rate of €22 per month from TeliaSonera. The Nokia N92 costs around €600.

The lack of content means that manufacturers are unwilling to offer DVB-H devices and mobile operators cannot market the service without content and devices. However, transmission company Digita has a 20-year license and it committed to the project.

### **France**

France has set aside a full national multiplex for DVB-H with 16 television channels and radio

services with up to 70-80 percent potential coverage prior to the November 2011 analogue switch-off.

Regulator CSA has launched a call for tender with a deadline of 15th January 2008 to award DVB-H licences to 13 television channels. The bids selected will be disclosed by April and licences awarded in June. All the major commercial broadcasters are expected to bid. Bidders are required to provide details on their plans for distribution, including the commercial model, and also whether broadcasts are free-to-air or encrypted. Public broadcasters will have three as yet unspecified channels. The broadcaster may use one each for France 2 and France 3, with the third split between France 5 and Arte

After the award of the licences, the licensees have two months to submit to the CSA an agreement to manage the multiplex, share transmission costs and award transmission contracts. Mobile operators could become shareholders in the multiplex company. If no agreement is reached by the licensees in the two-month window, licences will be invalidated

No agreement has been reached by channels and mobile operators on a business model. The major free-to-air broadcasters are ready to have their channels encrypted and distributed by mobile operators and over non-connected devices through the horizontal market. Canal+ envisages the direct distribution of an offer to consumers on non-connected devices, as well as a premium offer as part of the bouquet. A few smaller broadcasters want to be fully free-to-air.

Meanwhile, mobile operators want the full bouquet to be encrypted so that 1) they can subsidise handsets and 2) there is no risk, if as few as one or two channels were free-to-air, to have all channels follow suit, thus making it impossible to charge for the reception of DVB-H.

In any event a slow deployment is likely (CSA mandates 30 percent population 'outdoor' coverage within three years), as mobile operators will wait to face actual bandwidth constraints on the 3G networks which carry their existing mobile TV services.

The mandatory 30 percent coverage within 3 years is a minimum, and bidders are expected to present more aggressive deployment plans. All three mobile operators agree on the contrary on the need of a minimal critical mass of ca. 30 percent covered quickly to launch the service.

## **Germany**

The main focus of attention in Germany at present is the launch of mobile TV via DVB-H and there is sufficient spectrum available in the UHF band to launch one multiplex with nationwide coverage. However, it is possible that there may also be a free-to-air T-DMB service launched within the next two years, in addition to the already existing T-DMB service.

The Bundesnetzagentur (national spectrum regulator) issued a call for tender for frequencies for the operation of a nationwide DVB-H network in May 2007, and there were a total of three bids.

On the 15<sup>th</sup> October, it was announced that the winner is T-Systems Media&Broadcast GmbH. The company is planning to have the network operational in the Hannover region in time for the CeBIT 2008 exhibition. It is expected that the remaining fifteen capitals of the federal states plus

other major cities in Germany will be covered by the end of 2008.

In March 2007, the Landesmedienanstalten (LMA), or federal media regulators, issued a call for tender for the DVB-H platform operation and received two major bids: one from a consortium of mobile operators comprising T-Mobile, Vodafone Deutschland and O2 and the other from a joint venture known as Mobile 3.0 comprising Mobile Fernsehen Deutschland (MFD) and NEVA Media GmbH (financed by media companies Hubert Burda Media and Holtzbrinck Media. MFD is backed by Naspers/MIH, a major South African media and technology company.

On the 16th October, the LMA announced that its preferred bid was Mobile 3.0. Following a final decision by the media regulators, now not expected until January 2008, the Mobile 3.0 offer will need to be approved by the boards of each of the fourteen media regulators in Germany. Full commercial licenses for mobile TV services cannot be issued without a new national contract (e.g. between the federal states) which is under way. As a result, each individual regional state will issue "pilot" licenses to Mobile 3.0 which will vary from three to seven years depending on the region. This licensing process is not likely to be completed until mid 2008.

There is also interest in T-DMB mobile TV services in Germany. The first commercial T-DMB service in Europe was launched in Germany in May 2006 prior to the FIFA World Cup football tournament. Marketed under the brand name "Watcha" and operated by Mobiles Fernsehen Deutschland (MFD), the service uses L-band DAB network capacity leased from T-Systems Media&Broadcast and can be received in 16 major cities in Germany. The Watcha service offers 5 TV channels as well as all DAB radio stations available in Germany (see table page 47). The service is marketed by Debitel, Mobilecom and Simply Communications. MFD also markets the service directly via its own website. To date, the take-up of the service has been modest (around 10,000-15,000 subscribers). This is attributed mainly to the lack of marketing by mobile operators and a limited selection of mobile handsets.

Both the public and commercial broadcasters are planning to roll-out T-DMB mobile TV services from 2009 onwards. Mobile TV services are likely to be offered in conjunction with radio and other data services on the same multiplex rather than offered via a dedicated VHF T-DMB multiplex. Hence it is likely that these FTA services will compete with the DVB-H pay platform.

### **Greece**

Mobile TV is at a very early stage in Greece. There is some interest although there have not been any technical or commercial trials yet.

The priority at present is to continue with the roll-out of digital TV services via DVB-T. The process has started and there is currently one multiplex operated by the public broadcaster ERT. It covers around 60 percent of the population. A second multiplex is due to be launched in 2007.

The main interest in mobile TV is being shown by the broadcasters, particularly ERT, but it is unlikely that mobile TV via DVB-H or any other standards will gain traction until the digital TV licensing process has progressed further. The official date for analogue TV switch-off is 2012.

## **Ireland**

Regulator ComReg is prioritising, in terms of the allocation of frequencies, the launch of a national DVB-T platform over broadcast mobile television. DVB-T services were introduced on an experimental basis in Ireland only in 2006 and four fully fledged multiplexes are expected to launch in 2008. There are not enough frequencies available in Band III for a national TV bouquet before analogue switch-off.

Several mobile operators already distribute 3G-based TV bouquets in Ireland, and have substantial bandwidth available on their 3G networks to accommodate an increase in demand.

A DVB-H trial is under way since 2007 in Dublin and continues today. All market players appear to support DVB-H; MediaFLO has no backer yet.

Sufficient frequencies are already available for a broadcast mobile television multiplex covering major cities and ComReg will launch a consultation in early 2008, which could lead to the licensing of a multiplex – key players are the mobile operators and transmission companies. It appears that a licence would be issued to a multiplex operator, rather than on a channel-by-channel basis.

Much uncertainty remains over the business model for a broadcast mobile TV platform in Ireland, as in other European markets. Given the small size of the Irish market, mobile operators may wait and consider developments outside of Ireland before committing financial resources to a broadcast mobile TV platform.

## **Italy**

Italy launched two DVB-H multiplexes in 2006. In the same year three DVB-H platforms went on air: 3 TV from 3 Italia; TIM TV from Telecom Italia; and Vodafone Sky TV from Vodafone. Content is encrypted (with Nagravision) and exclusively accessible to each operator's subscribers.

3 Italia owns and operates its own national DVB-H multiplex. Telecom Italia and Vodafone lease bandwidth from the other DVB-H multiplex, operated by commercial broadcaster Mediaset, which cannot retail its own DVB-H bouquet or sell mobile-only advertising airtime under its antitrust undertakings.

Mediaset's major free-to-air channels are available on TIM TV and 3 TV, while public service broadcaster Rai's services are available only on 3 TV. The satellite pay-TV operator Sky Italia supplies basic thematic channels to all three platforms. Mediaset and Telecom Italia Media supply TIM TV and 3 TV with domestic football games. Adult content is also available.

The number of DVB-H handset models available on the Italian market is low, with just two to three models each from Samsung and LG. Nokia, who initially took issue with the conditional access solutions adopted by the three operators, will launch compatible models in 2008, and Motorola is also expected to supply the handset market. In a mobile consumer market driven by a rapid handset replacement cycle, the small number of models available and their high prices

are blamed for slow take up of DVB-H.

Without economies of scale being realised by manufacturers due to sufficiently strong global demand for DVB-H handsets, the price difference with other handsets could remain significant and a barrier to higher consumer take up.

Total DVB-H subscribers were about 800,000 in mid-2007: 3 Italia had over 700,000 TV subscribers in June 2007 thanks to a policy of heavily subsidising handsets and advertising on mainstream television; Telecom Italia and Vodafone had together less than 100,000 TV users, as they subsidise handsets only for their highest spending subscribers and are not publicising their services.

In late 2007, 3 Italia was shifting its publicity and advertising away from TV to web content access. 3 Italia also plans to use half of its multiplex for DTT from 2010. TIM was reviewing its approach and considering a shift in programming towards content re-purposed for mobile viewing.

Meanwhile, all three mobile operators with TV platforms are also actively deploying on-demand video services through their UMTS networks.

An alternative mobile TV platform using DAB/DMB could emerge in the medium term according to plans from broadcaster Rai and its transmission arm Raiway.

### **The Netherlands**

The Netherlands switched-off analogue terrestrial broadcasting in December 2006.

The incumbent telecom operator KPN has a uniquely strong position in broadcast mobile TV: It controls the national terrestrial TV transmission network and the Digitenne DTT platform with four national multiplexes while having the largest customer base of all mobile telephony operators. According to its 2001 licence, Digitenne is free to use part of its frequencies for mobile broadcast.

The Dutch government has taken a technology-neutral stand leaving KPN free to choose its standard for mobile TV broadcast. KPN has chosen DVB-H. The KPN DVB-H bouquet was planned for launch in late 2007 but this was postponed to 'before the 2008 Olympics', reportedly because of the need to secure a wider supply of compatible handset models. The bouquet will be available on a wholesale basis to third-party distributors.

Meanwhile, rival mobile telephony operators Vodafone and T-Mobile already retail mobile TV packages over 3G and KPN launched a trial 3G bouquet in September 2007. The commercial success or failure of the KPN bouquet will be an important indicator for a potential increase in the bandwidth devoted to DVB-H. If a failure, the emergence of rival platforms possibly using DAB/DMB is a possibility.

### **Norway**

The focus in Norway is on the launch of digital terrestrial TV at the present time and it is likely that Norway will adopt a "wait-and-see" strategy with respect to the roll-out of mobile TV

services via broadcast networks.

A major issue for Norway is the cost of rolling-out a dedicated DVB-H network. Norway is a sparsely populated and mountainous country with around 4.5 million inhabitants which means that it would be prohibitively expensive to build a nationwide network. A small population and high network costs means that it will be very difficult to create a viable business case in Norway. As a result, telecoms players such as Telenor are looking at the use of 3G/MBMS in conjunction with DVB-H.

Mobile TV in Norway could develop via a number of technologies. There is strong support for T-DMB from the public broadcaster while the telecoms industry favours the use of a combination of 3G, MBMS and DVB-H.

### **Portugal**

Although mobile TV services are offered on 3G networks, there are no immediate plans to launch mobile TV services via broadcast networks in Portugal.

There have been several technical trials and demonstrations in the country. In 2006, commercial broadcaster TV1 carried out a DVB-H trial with Vodafone Portugal in the greater Lisbon area. More recently, Alcatel-Lucent and Vodafone Portugal demonstrated DVB-SH technology using S-band frequencies. Channels broadcast included the Euronews channel (which was broadcast in several languages) plus content from RTP Mobile, SIC Channel and TVI Channel. DVB-SH handsets were provided by Sagem Mobiles.

RTP operates a DAB network in Portugal and although digital radio has stalled in the country since its launch in 1999, there is interest in using this network for mobile TV services via T-DMB. However, it remains to be seen whether there is sufficient political support for T-DMB within RTP as DVB-H is perceived as the preferred standard for mobile TV.

### **Spain**

Although DVB-H has been adopted as the de-facto standard for mobile TV, delays in passing new legislation by the Spanish parliament means that commercial services may not be launched until late 2008 or even 2009.

A technical plan will be published by the Ministry of Industry once the mobile TV legislation has been approved by the parliament. Then a call for tender for the network provider licenses will be issued. Finally, the regulatory conditions for content providers will be published. All these processes can be published without parliament approval.

A draft version of the technical plan has already been published which include the following proposals:

- Coverage: The government wants mobile TV to be rolled out in a 3 year period with deployment in several phases:
  - Phase 1: Cities with a population of more than 1 million (Madrid and Barcelona)

- Phase 2: Towns and cities with a population of more than 250,000
- Phase 3: All provincial capitals, autonomous cities and other autonomous community capitals of which there are 41 locations in Spain with a population between 225,000 and 30,000.

It is estimated that a DVB-H network covering Phases 1 and 2 would result in around 20-30 percent coverage of the Spanish population. However, some of the mobile network operators view DVB-H as a complement to their 3G networks and only wish to deploy DVB-H in the high density traffic areas rather than in the provincial capitals.

Spectrum for DVB-H will be limited to the major cities and provincial capitals until analogue TV is switched-off on the 3rd of April 2010.

- Content providers will be expected to pay transmission costs to the network operator although public broadcaster RTVE is lobbying the government to mandate that two or three of its channels should have “must-carry” status which probably means that RTVE will not be obliged to pay transmission costs.
- The DVB-H network license will be awarded by a beauty contest rather than an auction process.

## **Sweden**

Although all mobile operators in Sweden offer mobile TV services via their 3G networks, the launch of mobile TV services via a dedicated mobile broadcast networks seems a distant prospect at the present time and there are several options regarding the most appropriate technology platform.

A major issue in Sweden is the cost of rolling out a DVB-H network and whether it is possible to generate a return on the investment. A solution being proposed by Nokia is to build a hybrid DVB-T/DVB-H network whereby one part of the multiplex is used for DVB-T and another part is used for DVB-H. This may be a plausible solution in the future, but such a proposal seems unworkable under the current broadcasting legislation as public broadcaster SVT is obliged by law to provide its programming to 99.8 percent of the Swedish population.

The interest in using UHF spectrum for mobile TV via DVB-H among the broadcasting industry seems to have diminished recently. The broadcasters and the network operator Teracom believe that the spectrum should be used for fixed TV broadcasting (either SDTV or HDTV) rather than using exclusively for mobile TV via DVB-H or any other technology.

An option being proposed by SVT and supported by the public radio broadcaster Swedish Radio is to use VHF Band III frequencies for mobile TV and to reserve the UHF spectrum for fixed TV broadcasting. This would entail the use of Eureka-147-based mobile TV technologies such as T-DMB or an IP-based alternative such as DAB-IP.

There is also strong interest in using the digital dividend spectrum for mobile applications, in

particular, via MBMS. Ericsson, a major Swedish company, is a leading player in this market and there is support for the view that the government's industrial policy should support Swedish companies and Swedish technologies. However, the interest is probably for the long-term as no mobile vendors (with the exception of DVB-H hardware vendors) currently manufacture equipment for UHF frequencies.

It is likely that the government may adopt the same strategy it adopted with digital radio and decide to postpone a decision on mobile TV and the use of the digital dividend spectrum until it becomes clearer how the mobile TV is developing in other European countries and the issues regarding spectrum harmonization (particularly for mobile applications) across Europe have been resolved.

### **Switzerland**

It is likely that there will be two mobile TV services in Switzerland: one a pay or subscription service controlled by the mobile industry and targeted at mobile phone devices and the other a free-to-air service controlled by broadcasters and targeted (initially at least) at non-phone devices.

A call for tender for a national mobile TV license using the first multiplex was launched by the Swiss Federal Office of Communications (ComCom) on the 5th June 2007. Two candidates submitted bids: Mobile TV Schweiz AG (with partners T-Systems Media & Broadcast GmbH and South Korea Telecom) and Swisscom Broadcast AG, a subsidiary of the incumbent telecommunications provider Swisscom.

The bids were evaluated on a beauty contest basis and the criteria used included coverage and rollout schedules, business and service plan, contribution to media diversity, compliance with license conditions, legal requirements and financial credibility. On the 28th September, it was announced that the winning bid was Swisscom Broadcast.

The license will be for ten years and Swisscom Broadcast will be required to comply with a number of license conditions:

- Network coverage: In its call for tender, the regulator stipulated that the network operator should provide at least 30 percent network coverage by the end of May 2008 (including Euro 2008 host cities Basel, Berne, Geneva and Zurich) and at least 50 percent by the end of 2012. However, Swisscom Broadcast proposed to provide 44 percent population coverage by the end of May 2008 and approximately 60 percent by the end of 2012
- Technical standards - although the call for tender did not specify that a specific technical standard should be used, the regulator favors DVB-H and Swisscom Broadcast proposed to adopt this standard
- Unlike many other countries, there are no "must-carry" obligations for broadcasters. However, Swisscom Broadcast is obliged to provide "all TV broadcasters and

telecommunications providers with equal access to the platform under equitable and non-discriminatory conditions in accordance with article 51 of the Law on Radio and Television.”

With the Euro 2008 football tournament being held jointly by Austria and Switzerland in June 2008, the Swiss authorities have embarked on an ambitious plan to launch commercial DVB-H services prior to the tournament. Despite the political goodwill among market players, launching commercial DVB-H services in time for the Euro 2008 will be a challenge.

### **United Kingdom**

Mobile TV services are available over 3G from four of the UK's five mobile network operators, with channel package pricing ranging from £3 to £10 a month, although there has been limited reporting of the success of these services to date.

Broadcast mobile TV services were launched by BT Movio in October 2006, operating using DAB-IP technology in VHF Band III spectrum. However, the service has not managed to attract significant customer numbers or sufficient interest from the mobile operators, and it is due to close at the start of 2008. All of the four front-running technology contenders, DAB, DVB-H, MediaFLO and TDtv have been tested in trials in the UK.

Ofcom, the UK regulator, is currently pursuing a technology neutral approach to spectrum licensing, and hence no spectrum will be set aside specifically for mobile TV. Furthermore, the European Commission's attempt to centralise mobile TV broadcasting standards around DVB-H conflicts with Ofcom's position of technology neutrality, and currently any of the principal technologies could be used in the UK. Spectrum allocation will be through auctions, with L-Band spectrum due to be auctioned in H1 2008 and UHF spectrum from the digital dividend now likely to be auctioned in early 2009. Before 2012, there are only limited options for a mobile TV network in the UK, with Channel 36 in the UHF band and the L-Band the main contenders, while TDD and VHF spectrum remain outside possibilities

The prospects for broadcast mobile TV in the UK remain uncertain, as none of the main players in the UK has yet committed to running a platform, and competition for spectrum from other technologies such as WiMAX means there is no guarantee that spectrum will be available. Evidence of consumer demand for paid services has yet to be demonstrated, with the BT Movio service failing to garner sufficient interest. However, Sky is having some success with its premium packaged content.

Most industry players believe that broadcast mobile TV services are likely to be launched in the UK in the next few years, with the most likely scenario seen as a single platform operator using a content aggregation model and offering wholesale services to mobile operators.

### **Non-European markets**

#### **South Korea**

There are two competing mobile TV services in South Korea: a free-to-air T-DMB service

operated by the broadcasters and a competing S-DMB pay-service operated and marketed by the main mobile operator SK Telecom. Although South Korea is often cited as a success story for mobile TV, none of the Korean broadcast services seem to be profitable and handset sales appear to be driven by applications other than broadcast services.

There are six T-DMB broadcasters in South Korea: three incumbent terrestrial broadcasters (KBS, MBC and SBS) and three new service providers (YTN DMB, U1 Media and KMMB). They offer a total of seven TV channels on six multiplexes. Each multiplex typically carries one video channel broadcasting at a data rate of between 512- 544 kbps per channel. The licenses have been granted for a whole multiplex and broadcasters are able to offer any mix of service – TV, radio or data services

There is strong competition between T-DMB and S-DMB in South Korea. After SK Telecom launched its S-DMB service via TU Media in May 2005, LG Telecom and KTF (the second and third largest mobile operators) started marketing T-DMB services with the help of broadcasters such as KBS and SBS.

A surprisingly large proportion of T-DMB devices – approximately 40 percent – are car navigation devices, equalling the number of T-DMB mobile phone devices sold. In contrast, the majority of S-DMB devices - around or 96 percent - are mobile TV phones with only a small proportion being car navigation devices.

In early 2007, devices permitting unidirectional services based on TPEG, Broadcast Web Sites (BWS) and Slide Show (SLD) became available and several broadcasters have started offering these services. Consumers are obliged to buy a TPEG device and pay a one-off fee (approximately \$100) to a broadcaster which provides them with a lifetime access to the services. Although the TPEG data signal is not encrypted, consumers must decide which service provider they prefer when they purchase a terminal, as for example, a KBS TPEG terminal cannot access MBC TPEG services and vice versa. TTI services via TPEG are widely regarded as a killer application in South Korea and are boosting the sales of T-DMB car navigation devices.

## **China**

The Chinese market is very complex due mainly to the number of competing mobile TV standards, several of which are backed by different regulatory bodies. As a result, it is difficult to predict how the market will develop. However, the Chinese authorities are keen to showcase mobile TV technology to the world during the Olympic Games in 2008 and this could well be a major catalyst for mobile TV in the country.

There are a number of mobile TV standards, both domestic and international, being proposed for the Chinese market.

- CMMB – or China Mobile Multimedia Broadcasting is the new commercial name for the main national Chinese mobile TV standard. Also known by its technical acronym STiMi (Satellite and Terrestrial Interactive Multimedia Infrastructure), it was developed by the

Academy of Broadcast Sciences and operates at VHF and UHF frequencies for terrestrial broadcasting and S-band for satellite broadcasting.

- DMB-TH – or Digital Multimedia Broadcasting Terrestrial/Handheld is a handheld version of DMB-T, which is one of the standards used in China's new fixed digital TV standard.
- T-MMB – or Terrestrial Mobile Multimedia Broadcasting is being developed by Nufrontsoft (a Beijing software company), the Communications University of China and Southeast University. This is based on the Eureka-147 DAB standard.
- T-DMB – is also allowed in conjunction with DAB for audio but only for FTA services. However, retailers are not yet allowed to sell T-DMB mobile phones.

CMMB has already been approved as a national standard but it remains to be seen which of the others will achieve the same status. At present, a key issue for the Chinese government is whether these standards will be available commercially in time for the 2008 Olympic Games. At IBC 2007, SARFT officials insisted that CMMB was on schedule and claimed that the first CMMB chipset had been developed by a Chinese company called Innofidei. SARFT expects to have pre-commercial mobile TV services based on CMMB in six Chinese cities by the end of 2007 and to launch two satellites in Spring 2008. CMMB based mobile TV services will be available in 60 cities before the Olympics according to SARFT.

### **United States**

In the United States Qualcomm has developed a proprietary broadcasting standard, MediaFLO<sup>2</sup> that operates exclusively in the 700 MHz frequency spectrum and the company has nationwide rights to use this frequency band. Qualcomm expects to spend \$800 million to build out its entire nationwide network.

The company is expected to have less than half a million subscribers by the end of 2007 through its deal with Verizon. The service is known as VCast and offers 8 channels in 32 major markets in the US. Subscription rates range from \$13 to \$15 per month. Qualcomm is reaching out to other operators and secured a launch on AT&T's network, however, this has been postponed into early 2008.

In the US, the market is divided between MediaFLO and services like MobiTV, a TV service over existing mobile networks. Competition on exiting networks is also coming from a company called Alltel which launched its Mywaves service in July 2007, offering a wide variety of pre-recorded niche content charging about \$4 per month. The company claims over one million subscribers.

The DVB-H venture Modeo, a subsidiary of network operator Crown Castle, was shut down in summer 2007. Modeo failed to find partners willing to back the project and distribute the service.

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<sup>2</sup> Forward Link Only

# Conclusions

Mobile network operators have already been delivering video to mobile phone users for several years across European markets using existing cellular technologies. Broadcast solutions have emerged because of the inevitable capacity limits of UMTS networks; the need for mobile operators for differentiation and value added services in a highly competitive environment; and the widespread belief that consumer demand for broadcast services will grow.

So far, the growth of mobile broadcast television services in Europe has been tepid and the its real potential is still unknown. Slow development is the result of a shortage of spectrum in many key markets (e.g. UK); a lack of consensus on business models (e.g. Finland); and difficulties in many countries in establishing the regulatory framework needed to launch (e.g. Spain).

The most advanced market in Europe is Italy which launched full commercial services in 2006 and now has approximately 800,000 DVB-H subscribers, although its success may be questioned. The UK and Germany also have launched services with very little success, together accounting for several tens of thousands of mobile viewers. This may be due to the limited service offering provided to viewers.

Scenario for Mobile Broadcast Television in Europe (DVB-H)

Market drivers	2008	2009	2010	2011	2012	2013	2014	2015
<b>New commercial launches</b>								
Austria, Switzerland, Finland, France, Netherlands, Germany								
Spain								
Others								
<b>Content drivers</b>								
More channels launched on existing capacity								
UEFA European Football Championship								
Olympics/ World Cup								
Mobile copyright issues resolved								

Other factors influencing the services
<b>Network coverage/Spectrum availability</b>
Coverage reaches beyond large population centres
New spectrum becomes available (e.g. by ASO)
3G networks reach limits
<b>Consumer demand</b>
Interactive applications develop with use of telecom return channel
Handset prices decline substantially
Greater competitiveness and consumer choice in the handsets offered in the majority of markets
<b>Technology</b>
Future development of second generation DVB-H
Improved displays/power/local storage
<b>Business models</b>
Evolution of initial market launch models
Potential development of free-to-air advertising models

Several key markets are expected to launch services in 2008, including Austria, Finland, France, Germany (DVB-H), the Netherlands, and Switzerland. Spain will wait until 2009 to launch its mobile TV services given the delays to the regulatory regime caused by the upcoming elections.

Apart from Finland, the Nordics are more in a wait-and-see mode while smaller markets, like Greece and Portugal, and countries in central and eastern Europe may move forward if results in other markets prove positive.

The high profile launches in 2008 may encourage a period of optimism. However, a steady growth of subscribers will be necessary to prevent stagnation until 2012-2015 when certain key drivers and other factors influencing the services kick in (see charts above). While it will be possible to deploy a successful mobile television offer, a mass market potential will be difficult to achieve until significant swathes of spectrum become available.

Meanwhile, lessons can be learned from beyond Europe. In Asia, mobile television has proven to be successful with 10 million users in Japan and 7 million users in Korea. While this is due in part to the offer of free-to-air television services, the offer of such applications as traffic information has also proven popular with users.

The United States remains in early stages of development with total mobile broadcast service subscribers less than half a million. Overall in the US, only five million of the 220 million mobile users subscribe to a mobile television or video service.

### **The subscription-based model is the clearly emerging business model**

To the extent mixed models develop only the subscription segment will contribute any significant revenue in the medium term. In most currently launched platforms as well as impending launches, most generalist broadcasters have initially accepted the requirement of a subscription model although some would prefer a free-to-air model in the long-run. It is likely that any pay-model would be based on several tiers, including a basic subscription package for a small access fee supplemented by premium services. However, the penetration of mobile television receivers embedded in mobile phones could provide generalist broadcasters and advertisers with a sufficient market to allow for the launch of free-to-air services, perhaps sooner than expected.

### **Coverage will depend on spectrum availability**

In most countries launching mobile television services, coverage planning is for less than 50 percent of the population. For example in Finland, current coverage reaches 30 percent of the population and will increase to 40 percent by spring 2008. In France, 30 percent population coverage will be reached only 3 years after launch as required by the broadcast regulator although candidates are encouraged to commit to higher coverage figures. Current plans aim at covering over 50 percent of the population by 2011.

Exceptions include Italy which has a population coverage of 60 percent for DVB-H services. In

Germany, the network operator has agreed to cover 80 percent of the population by mid 2010, once analogue switch-off has been completed. Services will be launched in several countries and achieve large scale significance well before analogue switch off is completed, nevertheless services in some countries will not achieve high capacity and population reach until ASO makes sufficient spectrum available.

Analogue Switch-Off (ASO) timeline for analogue television

	Official target	Expected range
<b>Fast track</b>		
Finland	2007	<b>2006-2008</b>
Sweden	2007	
Netherlands	2006	
Germany	2008	
Switzerland	2008	
<b>Middle term</b>		
Belgium	2011	<b>2009-2012</b>
Norway	2010	
Denmark	2009	
Austria	2010	
Ireland	2012	
<b>Last</b>		
Italy	2012	<b>2012-2015</b>
UK	2012	
France	2011	
Spain	2010	
Portugal	2012	
Greece	2012	

### Mobile network operators continue to advance their multimedia offers

Most mobile phone operators have implemented 3G television services on their networks with a wide variety of pricing schemes. They continue to develop content, roll-out services, and refine business models. In this context, broadcast mobile TV will only be one element in a very competitive market for mobile content which now is dominated by games and music. At the same time, wireless network improvements like HSDPA and MBMS will alleviate to some extent the unicast constraints on those networks and allow for some expansion of usage.

### Consumer demand for mobile broadcast TV needs further confirmation

Early trials in Finland, Berlin, and then in the UK, Spain, and France in 2005/06 were encouraging to operators. Willingness to pay ranged from 40 to 75 percent, satisfaction was high, and daily viewing averaged about 20 minutes. However, these results seem to have been extrapolated by many into the general and universal belief that most people wanted to watch TV on mobile devices and were willing to pay for the service.

Recent studies are not as encouraging. In a Gartner study of European consumers published in

September 2007, mobile television and video downloads ranked close to the bottom of consumer interest: 95 percent of Europeans expressed no interest in watching television or video on their mobile phones in the coming year. In the UK, new research from BMRB showed that more than half never watched a video clip or downloaded music, and 75 percent said they were unwilling to pay even £5 a month for mobile TV services. InStat, in the US, conducted a survey of 1000 potential users and found that less than 7 percent would pay \$15 per month for television services.

Willingness of mobile customers to pay will be dependent on the amount of the service access fee. If drawing the parallel with other pay-TV services in Europe is valid, then the development of cable and satellite pay TV in Europe may teach us that penetration rates will remain low and grow to either a natural ceiling or a limit above which growth will be extremely slow.

Moreover, the type of content that has been successful on pay TV is very specific and may include exclusive content, primarily sports and films and also thematic channel packages. With mobile television, feature length films are unlikely to be consumed by mobile customers, leaving the implication that sports and news are likely to be the key drivers, while a bouquet of premium thematic channels represent the content that can boost the chances for pay mobile broadcast television. Audience data released by 3 Italia tend to confirm this pattern of usage.

Looking forward, a mass market can only develop when content is widespread, most of the population is covered, and consumer equipment passes beneath a certain lower price point, if it is not subsidised by service operators (mobile telecom operators and/or pay-TV operators).

### **Public Service Broadcasters will be key players**

Public Service Broadcasters (PSBs) are involved in content provision and to some extent in all key launch plans. The notable exception is YLE in Finland where copyright issues have hampered the broadcaster's ability to join the platform.

PSBs have experimented with offering their content on 3G networks in an effort to reach their audiences. For example, the BBC has provided a range of TV channels to the 3G networks of Orange, Vodafone and 3. Copyright-cleared content from BBC1, BBC News 24 and BBC Three has been made available for syndication. Projects like these have helped to develop the BBC's future mobile strategy.

PSBs (excluding those that run a network business) do not necessarily have a vested interest in a mobile TV platform. The situation is not the same as with the Digital Terrestrial Television (DTT) platform, for example, when their core business was at stake and they did drive the whole process forward from technical testing, to content provision, and coverage expansion. The success of DTT today is in large measure attributable to public service broadcasters. Their involvement also persuaded many governments to provide the financial support that was necessary in many cases. If mobile broadcast TV is not viewed as a public project, support like this may be less forthcoming.

The role of PSBs in mobile TV will in most cases be that of content providers to commercial platforms. PSBs are expected to manage this relationship in much the same way as they have with pay cable and satellite bouquets.

Therefore, until a free-to-air mass market develops, the imperatives for PSBs will be to monitor developments and try to ensure a conducive regulatory environment for the future. Beyond this, it will be important to focus on the content side for all mobile platforms: repurposing programmes and channels, developing applications, providing on-demand services etc.

Broadcasters may face - either competitively or cooperatively - a new type of content player emerging in the mobile broadcast industry. The audio and video constraints of mobile transmission technology require specialized production skills. Short-form, made-for-mobile content producers and aggregators are developing strong businesses with mobile network operators to meet this need. For example, in the US companies like MobiTV and GoTV provide packages of tailored TV content to mobile networks. Although major carriers have been acquiring rights directly from broadcasters, producers, and sports rights agencies, the short-form producers/aggregators are now offering a vast array of ready-made content that is a better fit to the mobile medium.

However, as long as viewers consider mobile television as a true 'television' service, broadcasters will have a key role in providing content. Their skills in generating content combined with their strong brand appeal will be essential in the provision of mobile television services.



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