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Mobile TV Services Provision Scenarios – Implications of Spectrum and Audiovisual Policies in the Development of Mobile TV Market in Europe

The objective of this article is to review and analyse the proposals made by the European Commission on spectrum management under the eCommunications framework and the TV Without Frontiers reviews in order to present their implications for the development and adoption of mobile TV in Europe, highlighting the importance of spectrum and audiovisual policies as enablers of future businesses around spectrum usage and multimedia services. The article then goes on to examine the business opportunities that the proposed changes offer to the industry, presenting the different business scenarios that could arise as a consequence of the reviews and their implications for mobile and multimedia services value chains and involved agents strategies. The overall objective† is to present the different options allowed by the varying policies and explore them to understand how the future mobile TV industry could be developed in Europe.

Introduction

mobile TV is the result of the convergence process between digital TV and mobile communications

Mobile TV in the European context

Analogue television constitutes the most widely used platform for communication in Europe, with a penetration of 98% of the total homes. On the other hand the mobile communications sector has become one of the greater phenomena in the European telecommunications industry, contributing decisively to its development and establishing it as an activity of great economic importance in the world. According to the data provided by the European Commission[1] more than 426 million people have mobile phones representing 92.8% of the population of the EU 25, and penetration exceeds 100% in eight member states.

Given the importance of audiovisual and mobile sectors for the European economy, the continuous convergence process among networks and platforms, and the power of digitalisation, mobile TV is seen as the next killer application that would best combine these two worlds.

Mobile TV is the result of the convergence process between digital TV (DTV) and mobile communications. As is well known, DTV provides greater spectrum efficiency compared to analogue solutions, and incorporates interactivity as its main added value. Although there are multiple factors affecting the development of DTV (such as regulation, content availability, network and terminal equipment), the European sector considers it vitally important to have a defined common standard that would guarantee the interoperability between the different existing platforms, and the development of applications that are independent of hardware and software.

In this context the members of the Digital Video Broadcasting (DVB) Project agreed the specification of a European open standard for DTV, known as Multimedia Home Platform (MHP) that defines a generic interface between the interactive digital applications and the terminals in which these applications are provided. In addition, this standard allows the development of new services and facilitates interoperability with other access networks.

Consequently, the DVB Project defined in 2004 the 'DVB – Handheld' standard (widely known as DVB-H‡) that, together with the specification DVB – IP Datacast (DVB-IPDC), comprise the European solution for the diffusion and reception of digital television in portable terminals.

† Although there are many factors affecting mobile TV development, this article will not consider, for example, technology complexities in detail, but rather focus on regulatory and policy aspects.

‡ DVB-H is based on the specification for digital terrestrial television DVB – Terrestrial (DVB-T), and incorporates elements that consider the limited duration of the battery of the mobile receiver and the particular behaviour of the mobile user.

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the revision of the regulatory framework for eCommunications currently under way has been designed to ensure that it supports the i2010 policy and the renewed Lisbon Programme

However, DVB-H is not the only standard developed by industry agencies, although in nearly all European countries mobile operators are piloting the DVB-H standard. Solutions like Digital Multimedia Broadcasting (DMB) supported by South Korean industry, Media Forward Link Only (MediaFLO) developed by Qualcomm, or the Japanese Integrated Services Digital Broadcasting standard (ISDB-T), apart from mobile and wireless access solutions, will compete in different regions as Tables 1 and 2 show.

Mobile TV has attracted broadcasters, mobile operators, new alternative operators based on wireless technologies, content producers, aggregators and providers, standardisation bodies, user devices and network manufacturers, and users. As a result, since 2003 it is mainly initiatives based on commercial partnerships that have been developed in order to explore the business opportunities for mobile TV worldwide, as shown in Table 2.

However, other alternative schemes could arise thanks to the increasing importance of wireless access technologies competing with existing fixed and mobile networks to provide broadband on the move‡. For this reason, current IPTV or P2PTV schemes from the fixed Internet segment could compete with the products developed by broadcasters and mobile operators.

As all solutions demand increasing capacity, the future decisions around spectrum management and band allocation will have a major impact on the future configuration of the different scenarios for service provision. In addition, audiovisual regulation will set the rights and obligations for all service providers, setting rules for audiovisual services as such, but not for the technology that delivers them.

In the following paragraphs, a revision of spectrum and audiovisual European regulatory frameworks affecting mobile TV are reviewed and their implications in the development of different business scenarios are considered.

‡ While mobile operators currently offer broadband access on a restricted basis (through pricing, number of Gbytes downloaded, decreasing speed of access for the most active users), the philosophy around wireless technologies is related to connectivity provision and unlimited Internet access, similar to that of fixed solutions (e.g. DSL, cable).

Electronic Communications and Audiovisual Regulation in Europe

As the Commission's 'i2010 – A European Information Society for growth and employment initiative' remarks[2]: '... in the 2006 review of the framework, the Commission will thoroughly examine its principles and mode of implementation, especially where bottle-necks are delaying the provision of faster, more innovative and competitive broadband services.'

In this context, the revision of the regulatory framework for eCommunications currently under way has been designed to ensure that it supports the i2010 policy and the renewed Lisbon Programme (for a review of the framework, see Feijoo et al[3]). Among other things, some of the specific objectives of the review are to examine the impact of the regulatory framework on investment and growth and explore alternative approaches, and evaluate how to improve spectrum management in the EU, and introduce greater flexibility of use.

This approach particularly affects new high-speed wireless services and applications that are driving demand for radio spectrum, such as broadband mobile, wireless local and wide area networks (like Wi-Fi and WiMAX) and DTV (in its different forms of provision). As mentioned before, among these services, mobile TV emerges as the next killer application – it is of paramount importance for the industry to build a profitable business around it.

In the area of eCommunication services, conditions for access to, and use of, radio resources still vary according to the type of operator, for example, between mobile operators and broadcasters, while the electronic services provided by these operators increasingly overlap. Hence these services require further increase of spectrum capacity for their implementation and commercialisation, as the converging environment evolves towards audiovisual media integration into existing service offers.

In this context, EU policy aims to facilitate spectrum access across the EU through market mechanisms, based on the principles of technology and service neutrality, by proposing a set of principles and rules that boost innovation in ICT and bring more flexibility to the management of this resource, thus achieving more efficient use of it.

In addition to the eCommunications framework, a proposal to update the TV Without Frontiers (TWF) Directive (first issued in 1989), to keep pace with rapid technological and market developments in Europe's audiovisual sector, was addressed

Table 1 Mobile TV standards comparison

	Frequency bands	Geographic location
S-DMB	Ku and S bands	South Korea
DVB-SH		East Europe
T-DMB	VHF or L- band	South Korea China Germany India United Kingdom Russia
ISDB-T	VHF, UHF or SHF	Japan
DVB-H	UHF or L- band	Finland Italy Vietnam Germany Spain USA France United Kingdom
MediaFLO	UHF	USA United Kingdom
UMTS (MBMS)	2.1 GHz	Europe
Wi-Fi	2.4 or 5 GHz	Global
WiMax	2.5 or 3.5 GHz	Global

Table 2 **Mobile TV pilot initiatives**

	Country	Launch	Partners
T-DMB	South Korea	2005	SK (South Korea) Telecom TU (Television for You) Media
	China	2006	Samsung Beijing Jolon DMB Guangdong Mobile Television Media
	Germany	2006	Anixe TV MFD (Mobiles Fernsehen Deutschland) Walk'n Watch Western Start Samsung
	India	2006	TRAI (Telecom Regulatory Authority of India) Tata Group Star TV India Zee TV Bharti Tele Ventures (Airtel)
	United Kingdom	2006	BT Movio Virgin Mobile
	Russia	2008	Sistema Mass Media SK (South Korea) Telecom T-Systems
ISDB-T	Japan	2003	KDDI NHK NTT DoCoMo
DVB-H	Finland	2006	Nokia Digita Elisa TeliaSonera Finland MTV Channel Four Finland (Nelonen) YLE
	Italy	2006	Hutchinson Telecom Italia
	Vietnam	2006	VTC Mobile Nokia
	Germany	2006	T-Mobile Vodafone O_2 E-Plus
	Spain	2006	Telefónica Móviles Vodafone Orange
	USA	2006	SES AMERICOM Hiwire
	France	2005	CANAL+ Nokia SFR (Société Fraçaise de Radiotéléphone) Towercast
	United Kingdom	2005	O_2 Nokia
MediaFLO	USA	2007	Qualcomm Verizon Samsung
	United Kingdom	2006	Qualcomm BSkyB (British Sky Broadcasting)

by the European Commission in December 2005, and it is currently going through the revision process in the European Parliament.

Therefore, the aim of the TWF Directive revision, which will be called the Audiovisual Media Services (AMS) Directive, is to define rules for audiovisual media services in a platform-neutral way, which would mean that the same basic rules apply to the same kinds of service, and the set of applicable rules shall no longer depend on the delivery platform but on the nature of a service.

Particularly for mobile TV, both regulations have a strong impact on the development of the European market as players will take their decisions depending on the spectrum availability, the alternatives

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for providing content and services, and the way they are ruled. In the following sections, spectrum regulation under the EU framework revision and audiovisual rules within the future AMS Directive are reviewed in order to present their implications for the definition of different mobile TV services provision models that could be implemented.

Spectrum Management under the eCommunications Framework Revision

The publication of the Green Paper on Radio Spectrum Policy in 1998[4] started a wide-ranging debate on the main aspects that affect the management of this resource at the European level, as it was foreseen that new upcoming services and applications would demand increasing spectrum.

Following the Green Paper, the Commission issued a public consultation on how to define an institutional framework for spectrum policy co-ordination across Europe. As a conclusion[5], the EC identified the necessity to establish a general framework for spectrum harmonisation[†], which would be adopted in the future.

In 2002, with the aim of contributing to the definition, elaboration and application of an EU harmonised policy on spectrum, the Commission issued the Radio Spectrum Decision[8] as part of the new regulatory framework for electronic communications which came into force on April 2002. The main objective of this Decision was the creation of a legal and political framework to guarantee the co-ordination of different policy initiatives, and to harmonise the conditions that allow the availability and the efficient use of the spectrum. In this sense, Spectrum Decision recognised the possibility that any member state could

[†] It should be noticed that before the public consultation result, the EC had issued two different documents in order to develop pan-European mobile services. These documents harmonised the allocation of frequencies in all member states for GSM[6] and UMTS[7].

incorporate spectrum trading mechanisms in its national regulatory framework.

In addition, the Radio Spectrum Decision established the creation of the Radio Spectrum Committee (RSC†) and the Radio Spectrum Policy Group (RSPG‡) in order to assist the Commission in all decision processes.

In May 2004, the European Commission requested the RSPG to develop and adopt an opinion on a co-ordinated EU spectrum policy approach for wireless electronic communications radio access platforms, to be addressed to the European Commission. The objective was to ensure spectrum availability for a wide variety of services and applications to meet the requirements of the Lisbon agenda, and to comply with the overall policy goal of developing the EU internal market and European competitiveness.

Following an EC mandate, the RSPG issued a document in November 2005 offering its opinion[9] on Wireless Access Policy for Electronic Communications Services (WAPECS) implications for electronic communications markets. For that purpose, the RSPG conducted a public consultation in parallel with the ongoing discussion in the RSPG. Taking into account the results achieved, the RSPG identified the main constraints†† that have the potential to limit the use of particular bands (broadcasting, mobile and fixed bands are among those considered) for WAPECS.

These constraints set out by RSPG became a starting point for the 2002 framework review in the field of spectrum, initiated in 2006[10]. The review, that highlights spectrum management as a key element for the electronic communications sector, aims to include the conditions for using spectrum in general authorisations‡ for the provision of electronic communication services, with the objective of reducing hurdles to market entry as much as possible.

In this context, new spectrum management relies on the following main principles:

- freedom to use any technology in a spectrum band (technology neutrality†);
- freedom to use spectrum to offer any electronic communications service (service neutrality‡‡);
- granting of exclusive right of use on the basis of individual licences only subject to clear justification that the risk of harmful interference cannot be managed in another way;
- facilitating access to spectrum resources for market players by using, in particular, mechanisms such as trading of exclusive spectrum usage rights to optimise efficiency and flexibility of usage and reduce access costs.

Although the current framework allows spectrum trading, this mechanism has not yet been developed. For that purpose, the Commission is committed to achieving spectrum commercialisation before 2010 in some bands, particularly those below the 3 GHz limit. As a result of this, the RSPG has recently published an opinion on the introduction of multimedia services, in particular in the frequency bands allocated to the broadcasting services[11], in which RSPG urges the Commission to remove unnecessary constraints in current licences for broadcasting, mobile and fixed services that can stop the development of mobile TV services.

From TWF to AMS

In October 1989, the European Council published the Television Without Frontiers Directive[12] as a first step towards the creation of a common space of broadcasting in the European Union. The Directive aimed to ensure the free movement of broadcasting services within the internal market and at the same time to preserve certain public interest objectives, such as cultural diversity, the right of reply, consumer protection and the protection of minors. It also intended to promote the distribution and production of European audiovisual programmes, for example by ensuring that they are given a majority position in television channels' programme schedules.

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The development of digital television was the first milestone for the revision of the audiovisual framework, and, as a consequence, the TWF Directive review was conducted and published in June 1997[13]. Among the relevant issues modified were the principle of jurisdiction (the member state responsible for television channels is determined by the location of the head office and the place where programming decisions are made), the definition of events of major importance for society (each member state may therefore draw up a list of events which have to be broadcast in open form, even if exclusive rights have been purchased by pay-TV channels), and the protection of minors (member states must ensure that programmes that are likely to impair the development of minors and are broadcast in open form are to be preceded by an acoustic warning or identified by a visual symbol).

Once again, to keep pace with technological developments, the new proposal for the TWF Directive[14] defines rules for audiovisual services as such, not for the technology that delivers them. It should be noted that this brought about the change of name of the Directive, which is

† The RSC assists the Commission in the development and adoption of technical implementing measures aimed at ensuring harmonised conditions for the availability and efficient use of radio spectrum, as well as the availability of information related to the use of radio spectrum.

‡ The RSPG adopts opinions, which are meant to assist and advise the Commission on radio spectrum policy issues, on co-ordination of policy approaches and, where appropriate, on harmonised conditions with regard to the availability and efficient use of radio spectrum necessary for the establishment and functioning of the internal market.

†† Legacy issues arising from the initial assignment of individual rights to use frequencies, lack of flexibility in some existing licences, particularly arising from regional and international agreements, excess of technological prescriptions in some licences, the use of the bands by services pursuing particular general-interest objectives (e.g. services of general economic interest, safety-of-life services), and the use of the bands by other applications which are not electronic communications services (e.g. governmental).

‡ This approach is well reflected where spectrum access is operated on an 'unlicensed' basis. However, a more common practice is to grant exclusive usage rights on the basis of individual licences, in order to guarantee an appropriate level of protection against harmful interference. As a general trend, technological progress has progressively reduced the risk of harmful interference and therefore has made the use of individual rights less necessary in certain bands.

† The principle of technology neutrality is recognised by the current regulatory framework and the WAPECS initiative.

‡ ‡ This principle allows owners of spectrum usage rights the freedom to provide any type of electronic communications service in that spectrum.

now to be known as the Audiovisual Media Services Directive[15].

At the same time, the Commission proposal distinguishes between linear services (e.g. scheduled broadcasting via traditional TV, the Internet, or mobile phones), and nonlinear services (e.g. non-scheduled broadcasting, video-on-demand and Web-based news). In this context, today's TV broadcasting rules would apply to linear services, albeit in a modernised, more flexible form, whereas nonlinear ones would be subject only to a basic set of minimum principles (e.g. protection of minors, prohibition of incitement to hatred, identification of the media service provider, clear rules on product placement and sponsoring, among others).

The distinction between TV broadcast or linear services on one hand, and non-linear or on-demand services on the other, depends on who decides when a specific programme is transmitted and whether schedules exist. The differing degrees of regulation of content 'pushed' by suppliers or 'pulled' by users reflects differences in user choice and control and in the likely impact on society. In addition, audiovisual media service providers will have to comply with the proposed Directive, whereas ISPs, acting only as content carriers, will not.

Another relevant aspect is that on-demand services are mainly regulated by the eCommerce Directive[16]. This Directive is based on 'the country of origin' principle, but still allows member states to make exceptions to this principle for a wide range of public policy reasons.

As a result, EU member states currently have no common rules governing on-demand audiovisual services in the key areas addressed by the present TWF Directive. As all these issues would, under the Commission proposal, now be included in the TWF Directive, providers of non-linear audiovisual media services could also benefit in the future from the country of origin principle and then be subject only to the rules in the EU country in which they are established.

Mobile TV Services Provision Scenarios

The main restriction from a regulatory perspective is the spectrum availability for mobile TV services, which will be dependent on the final revision of the eCommunications framework review, currently under way. From the previous analysis, one of the main questions to be resolved by the European Commission is the particular criteria that will apply to allocate spectrum resources.

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The TWF Directive revision covers a higher number of audiovisual services than can be classified according to the network over which services are provided (traditional terrestrial, satellite and cable TV platforms – analogue and digital – the Internet, the fixed network of the main telecommunication operators, mobile cellular networks and mobile TV networks), and the linear or nonlinear services nature.

This classification would then result in the application of a different degree of regulation for linear and nonlinear services as explained before. The main question would be to know the possible impact of this regulatory approach.

Then, depending on the final decisions on spectrum, and considering the rights and obligations that the upcoming Audiovisual Media Services Directive will impose, three possible scenarios of mobile TV services provisioning have been defined in order to show what impact potential regulatory decisions may have on the development of the mobile TV market. Although it is not yet clear how the business model for mobile TV will evolve, pilot experiences suggest that any business model would rely on part-nerships between operators, broadcasters, manufacturers, and media and Internet companies[17].

Cellular scenario

Many European operators have started pilot trials using UMTS spectrum, and some of them currently commercialise mobile TV services (e.g. O_2, Orange, T-Mobile, and Vodafone, which has offered mobile TV on its UMTS Vodafone Live! since December 2005). Unless the demand for 3G services grows rapidly, this solution can be sustainable only in the short term, as it will become a risk in the future since audio-visual services would coexist in the same band with other broadband services.

These commercial services are provided through direct streaming to end users (unicasting) usually accessible on the operator's Web site, using the UMTS spectrum for that purpose. This model gives the operator total control of its business, in a similar way to the walled garden approach for mobile Internet services[18], to explore user adoption patterns. Obviously, attributes such as price, quality of the content offered, and easy-to-use handset availability will be some of the key elements. For example, regarding pricing strategy, most operators are using a monthly fee subscription independent of any other services for accessing TV content.

In this scenario, the operator owns the infrastructure but usually has a lack of a solid content offer, so commercial agreements with multimedia, audiovisual and Internet agents seem to be crucial. From a business model perspective, mobile TV is a new distribution channel for these agents, and so they would be interested in almost any form of partnership with operators. At the same time, mobile operators usually have a renowned brand and provide a trusted content delivery in order to protect them from insecure and illegal practices, which can even reinforce collaboration. For all that, as Figure 1 suggests, intensive partnerships would mainly arise at content provisioning.

Obviously this model of provision is currently restricted to mobile operators that hold spectrum for GSM and UMTS technologies. However, this allocation based on technology is a bottle-neck for future service development. This is the reason why mobile operators are pushing the European Commission to apply the principles of technology neutrality in both GSM and UMTS bands.

While subscriber numbers and volumes of video traffic are low enough to avoid network problems, this scenario can be considered as the most suitable for a mobile operator as it does not require further investment on infrastructure. However, as the number of users grows, unicasting schemes could lead to increasing network congestion. As a result, mobile operators are interested in exploring other options that permit broadcasting schemes for mobile TV services provision, combining then the potential of mobility with a broadcast network and leaving UMTS free for alternative uses.

Broadcasting scenario

This model is similar to the classic broadcasting, with the main difference

Figure 1 Value chain for cellular scenario

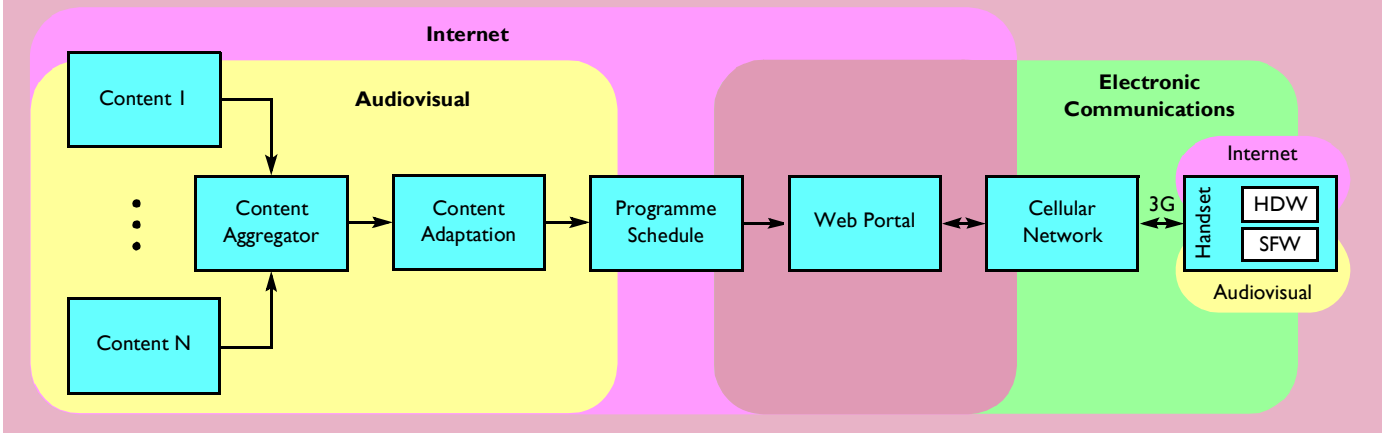
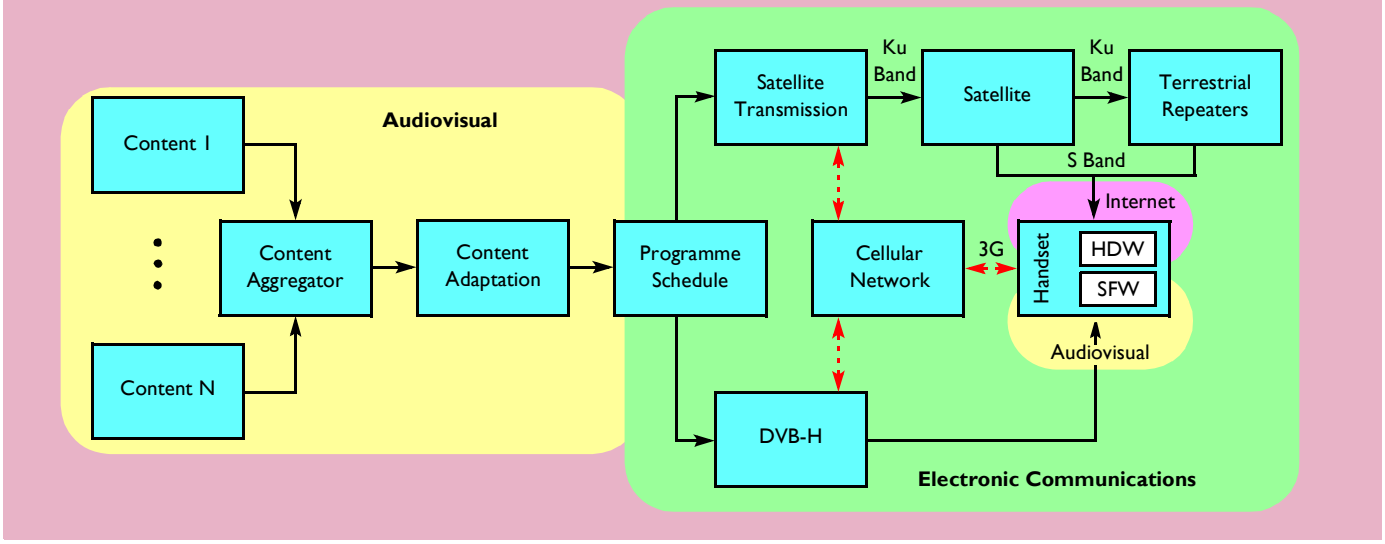


Figure 2 Value chain for broadcasting scenario



being that, in the current digital context, interactivity is a key element. For that purpose a cellular network can be used, promoting its interaction with the broadcasting network for mobile devices. Hence, the broadcasting scenario facilitates the coexistence of both types of network, and the achievement of partnership agreements between the agents involved.

For broadcasters, mobile TV through broadcasting is a natural extension of their current business, expanding its target audience to a wider number of consumers, and mobile networks would help to develop interactive services and applications in which the uplink is provided by mobile facilities.

For mobile operators, broadcasting technologies and standards are an opportunity to liberate the spectrum owned for UMTS, and provide TV services in a more efficient way thanks to broadcasting channels.

This scenario requires further investment in the adaptation of existing broadcasting networks to mobile user requirements (for broadcasters) or the development of new ones (for mobile operators). Any strategic decision would depend directly on the way the spectrum needed is issued, as the spectrum right holder would probably dominate the value chain and lead the network deployment.

Within the European market, DVB-H is the main standard adopted and broadcasting services could be provided, as several pilot projects suggest, by two alternative means – terrestrial or satellite†. In both cases the final user takes advantage of broadcasting and mobile networks to enjoy interactive services and applications.

This scenario (Figure 2) will probably be one of the most likely to be developed as current allocation for DTV in some European countries reserves spectrum for mobile TV services based on DVB-H, within the UHF band. These resources could be extended to other bands, as for example the L-band from 1452 to 1492 MHz. However, the treatment that the European Commission will give to these bands in terms of individual use or general authorisation is unknown, and so is the frequency harmonisation for DVB-H bands.

In this context both mobile operators and traditional broadcasters could potentially be interested in developing this model, particularly in the case where the spectrum is assigned for individual use.

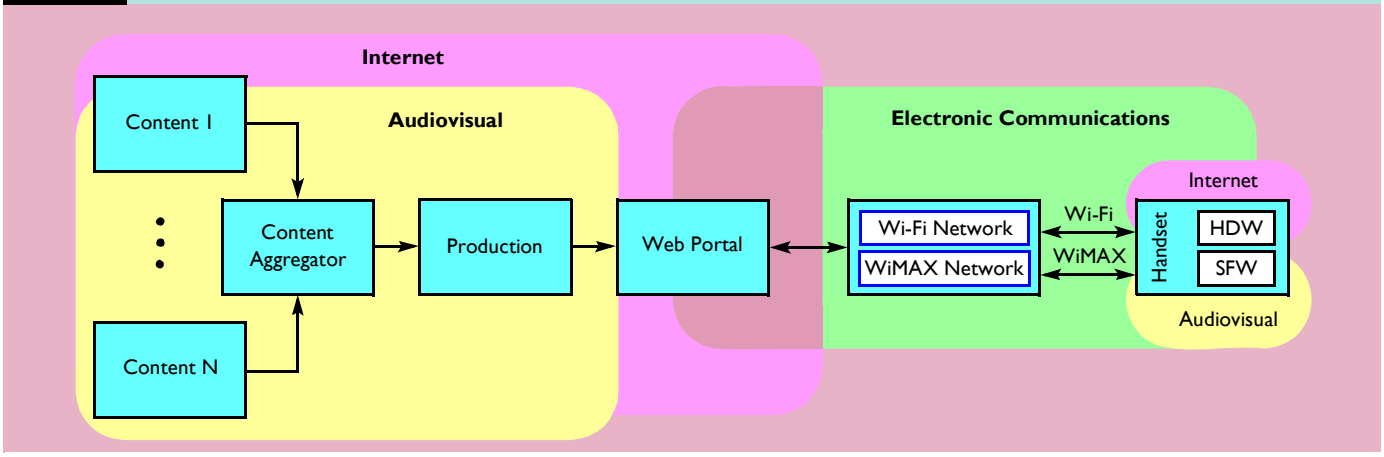
† This is the option being considered by South Korean operators.

Connectivity scenario

This model implies the complete extension of the Internet paradigm to mobile and wireless services. It is obviously dependent on the development of alternative wireless technologies and the availability of spectrum for them (usually unlicensed bands). As users could enjoy similar services to that from the Internet using a fixed connection, the availability of content is immediate, and guarantees the existence of a wide and varied offer.

This scenario (Figure 3) would be of particular interest for fixed broadband providers that look for extending their business to the mobile arena[19]. As many of them currently commercialise IPTV services

Figure 3 Value chain for connectivity scenario



on a subscription basis, the strategy for them would just require deployment of wireless facilities, minimising the extra need for strategic partnerships with other agents (as opposed to the two previous scenarios).

In addition, pure wireless connectivity players would get benefit from this scenario, as the user only requires connectivity to access, for the price of the connection – a global offer thanks to the large number of media agents and Web sites providing their audiovisual content through the Internet. Then this scenario can be seen as a way of disintermediation of TV broadcasting and mobile services value chains, being a direct threat to broadcasters and mobile operators.

Obviously, the amount of spectrum available for wireless access technologies would be a key element for the development of this scenario, as the philosophy inherent to wireless technologies, supported as well by WAPECS, requires a high degree of freedom for spectrum use based on the general authorisation regime.

Conclusions

Mobile TV comes about as a result of the combination of two widely known popular products, the mobile phone and the television, that have enjoyed a great commercial success lasting for many decades. Naturally, mobile TV is seen by broadcasters and mobile operators as the next killer application for their respective businesses.

In addition, there is an increasing interest in mobile TV within the media world, as it is an additional distribution channel with the potential to extend their reach to a global audience. Mobile TV is attractive too for other players such as fixed broadband operators or wireless connectivity providers. In all cases, spectrum management decisions and audiovisual regulation issues are fundamental for market and business model configurations.

Regarding the latest TWF Directive review, the proposal made by the Commission in December 2005, and supported in its first reading by the European Parliament in December 2006, tries to recognise the convergence of technologies and markets around audiovisual. In fact the term television will be removed from the title of the Directive, adopting instead audiovisual media services.

A future Audiovisual Media Services Directive will recognise technology neutrality as a basic principle, in a way that a set of common principles are applied to every platform/network providing audiovisual services. In addition, the distinction between linear and nonlinear demand services will serve as the main criteria to differentiate applicable regulation in each case.

As presented in this article, mobile TV can be seen as a set of possible combinations of broadcasting and mobile businesses, while a connectivity scenario would be related to IPTV and Internet. Given the difficulty to assess the impact of the AMS Directive and recognising the need to adequately fit current and future services into a uniform regulation, service providers will need considerable flexibility for commercial take-up, at least in the early years of service development, no matter which strategic option is chosen. Hence, it would be reasonable to apply the concept of an emerging market in this context, in a way similar to the emerging market status recognised within the EU framework of electronic communications.

Concerning spectrum management, a new regulatory framework should promote the liberalisation of its use, as well as the creation of the secondary market for spectrum trading. Liberalisation implies the possibility of using any technology in a certain frequency band (technology neutrality) and allowing the spectrum use for any service (service neutrality).

These principles have been defined in order to reduce barriers to market entry as much as possible, but its application, although necessary to stimulate future competition in wireless services and platforms, should be introduced gradually to avoid any market distortion. In addition, gradual market openness is of crucial importance for the success of a secondary market for spectrum – but excessive fragmentation and protection against harmful interferences should be guaranteed.

The new framework should also define the criteria to divide spectrum into:

- unlicensed bands,
- frequencies under the direct supervision of NRAs;
- tradable frequency bands.

According to the scenarios presented, broadcasters and mobile operators would try to keep current exclusive rights for bands already issued for DVB and UMTS, while connectivity scenario defenders would demand more unlicensed bands.

Given the commercial interest in exploring new business opportunities around mobile TV, interim spectrum decisions should be taken, since many

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investment decisions cannot wait until the 2010 horizon set by the Commission. For this reason, all players are urging the Commission to stimulate the electronic communications market through spectrum management, taking into consideration the application of the service neutrality principle in all bands issued to mobile operators for commercial services (GSM band is an example), the harmonisation of DVB-H bands around Europe, and the evaluation of additional bands suitable for the application of the general authorisation regime. These measures would foster competition through all the scenarios presented in an attempt to leave market forces to compete in equal and non-discriminatory conditions.

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References

1 European Commission. European Electronic Communications Regulation and Markets 2005 (11th Report). COM 68, February 2006.

2 European Commission. i2010 – A European Information Society for growth and employment. COM 229 final, June 2005.

3 Feijóo, C., Gomez-Barroso, J. L. and Rojo-Alonso, D. European competition law in the Electronic Communications Sector: evolution and critical analysis. Annales des Telecommunications, July– August 2006, 61(7-8), pp. 847– 864.

4 European Commission. Green Paper on Radio Spectrum Policy. COM 596. December 1998.

5 European Commission. Communication on Next Steps in Radio Spectrum Policy: Results of the public consultation on the Green Paper. COM 538, 1999.

6 European Commission. Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community. June 1987.

7 European Commission. Common position adopted by the Council concerning the coordinated introduction of a third-generation mobile and wireless communications system (UMTS) in the Community. September 1998.

8 Decision 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community (Radio Spectrum Decision) (OJ L108/1) 24 April 2002.

8 RSPG. Opinion on Wireless Access Policy for Electronic Communications Services (WAPECS) – A more flexible spectrum management approach. RSPG05-102final. November 2005.

10 European Commission. Commission staff working document on the Review of the EU Regulatory Framework for electronic communications networks and services {COM(2006) 334 final}. Brussels, SEC816, 28 June 2006.

11 RSPG. Radio Spectrum Policy Group Opinion on the Introduction of Multimedia Services. RSPG06-143 Final. October 2006.

12 Council Directive 89/552/EEC of 3 October 1989 on the coordination of certain provisions laid down by Law, Regulation or Administrative Action in Member States concerning the pursuit of television broadcasting activities. 1989.

13 Directive 97/36/EC of the European Parliament and of the Council of 30 June 1997 amending Council Directive 89/552/EEC on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the pursuit of television broadcasting activities. 1997.

14 Proposal for a Directive of the European Parliament and of the Council amending Council Directive 89/552/EEC on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the pursuit of television broadcasting activities. Brussels, COM 646 final, 13 December 2005.

15 Draft European Parliament legislative resolution on the proposal for a Directive of the European Parliament and of the Council amending Council Directive 89/552/EEC on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the pursuit of television broadcasting activities (COM 0646 – C6-0443/2005 – 2005/0260(COD)), December 2006.

16 Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market. June 2000.

17 IBM. Primetime for Mobile Television. IBM Global Business Services, April 2006.

18 Ramos, S., Feijóo, C. Castejón, L. Pérez, J, and Segura, I. Mobile Internet Evolution Models. Implications on European Mobile Operators: The Journal of the Institution of British Telecommunications Engineers, July–September 2001.**1**(2).

19 Ramos, S, Pérez, J. and Jordan, A. Fixed Broadband Strategies for Mobility Integration The Journal of The Communications Network, April–June 2006, **5**(2), pp. 16–21.

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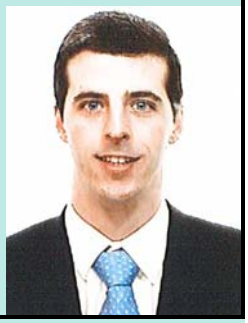

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