



Commission for
Communications Regulation

Briefing Note

Mobile Television

Document No:	06/62
Date:	7, December 2006

Contents

1	Executive Summary	2
2	Introduction	4
2.1	THIS NOTE	5
3	Using Mobile TV	6
3.1	APPLICATIONS.....	6
3.2	USER CREATED CONTENT.....	7
3.3	INTERACTIVITY.....	7
4	Mobile Broadcast Technology and Standards	8
4.1	MOBILE TV CONTENT OVER 3G	8
4.2	DVB-H	9
4.3	DIGITAL MULTIMEDIA BROADCASTING (DMB)	9
4.4	OTHER STANDARDS	10
4.5	VIDEO COMPRESSION TECHNOLOGIES	10
4.6	FUTURE DEVELOPMENTS	11
4.7	SUMMARY	11
5	Market & Commercial Issues	12
5.1	CONTENT PROVIDERS AND BROADCASTERS	12
5.2	MOBILE OPERATORS.....	13
5.3	EQUIPMENT MANUFACTURERS	14
5.4	CONSUMER DEMAND	14
5.5	EARLY DEPLOYMENTS AND RECENT DEVELOPMENTS	14
5.5.1	<i>Early Deployments</i>	14
5.5.2	<i>Irish Trials</i>	15
5.5.3	<i>Recent Developments</i>	16
5.6	SUMMARY	16
6	Regulatory Implications	17
6.1	REGULATORY ENVIRONMENT	17
6.1.1	<i>Content Regulation</i>	17
6.1.2	<i>User Protection</i>	18
6.1.3	<i>Conditional Access</i>	18
6.1.4	<i>Requirement for a TV Licence</i>	18
6.2	RADIO SPECTRUM	19
6.2.1	<i>Frequency Bands</i>	19
6.2.2	<i>Digital Switchover</i>	20
6.2.3	<i>Spectrum Strategy</i>	20
6.2.4	<i>Test and Trial Licence Scheme</i>	21
7	Conclusion.....	22
8	Annex 1 - Comments on this Briefing Note	23

1 Executive Summary

One of ComReg's key roles is to encourage innovation in the Irish communications industry. The Forward Looking Programme (FLP) is used to help achieve this aim by making people aware of various technology developments and trends in the ICT sector. This goal is primarily achieved through the release of Briefing Notes. These are documents that typically cover technical topics for those with an interest and basic knowledge of the communications industry.

This briefing note is on the topic of mobile TV services. Increased capabilities of advanced mobile and portable technologies are bringing multi-media services such as TV to mobile consumers in Ireland. Video download services are already available on 3G networks, and enhanced variations are expected in the future. Mobile TV represents a convergence between the mobile and broadcasting sectors, making use of new technology, services and business models. In this briefing note the definition of Mobile TV covers both advanced forms of traditional broadcast TV to mobile users as well as video download type services targeted at mobile users. This represents a level of convergence between Internet, mobile and broadcasting services.

The applications and value of mobile television are explored in Section 3 of this document, highlighting some of the ways in which mobile TV is expected to be used. Increased interactivity relative to traditional TV, and the growing importance of user created content are the two main trends considered here.

Mobile TV is emerging on a number of parallel competing technologies and with strong backing (equipment manufacturers, operators and broadcasters). It is likely that multiple standards and technologies will coexist as markets develop differently in different countries, and this is already evident from early trials and commercial deployments. Standards and technology for mobile TV are covered in Section 4, drawing comparisons between the main competing mobile TV standards and systems being developed.

Market dynamics will ultimately determine whether one is more successful than others, or whether multiple technologies will co-exist with one another. The various aspects of the competing mobile TV systems from a technical and business model perspective must be carefully considered by any operator seeking to deploy a mobile TV service. Factors such as user demand and pricing and packaging of services are likely to be key elements. In Section 5 market and commercial issues are explored with respect to the different players in the mobile TV sector, and how they might interact as mobile TV gathers pace.

Aside from market developments, the availability of spectrum will play a key role in how mobile TV develops. In particular any spectrum dividend from the move to digital broadcast TV is likely to affect the development of mobile TV services. Other regulatory issues could arise if mobile TV services are provided via a shared single broadcast infrastructure using conditional access systems. In Section 6 we consider key issues associated with the introduction of mobile TV, some of which are beyond the scope of ComReg's regulatory remit.

At ComReg we are keen to encourage innovative new communications products and services in Ireland. Early broadcasting and video-download services are already available on 3G networks and other technologies have been tested and trialled here. We would welcome any comments on this document and on any issues it raises¹.

¹ See Annex 1 for details on how to submit comments.

2 Introduction

The ability to deliver television services to mobile handsets is now a technical reality. Equipment is available and being developed by manufacturers, and multiple trials and some commercial services have been launched. Content providers are adapting content² made for traditional TV to mobile use (i.e. small screen size and shorter viewing periods), and developing content specifically for the mobile TV market. Some industry analysts are predicting rapid growth in the deployment and take-up of mobile TV, while others foresee a more gradual adoption.

Although mobile television is a relatively new service it has come about as a result of a convergence between two well established services: television and mobile communications. It is part of an overall convergence between different media types and different delivery technologies.

Television was initially adopted relatively slowly as receivers were large and expensive until technology developments during World War II made them affordable and more suitable to the mass market. It then took 30 years – from 1950 to 1980 – for TV to reach truly widespread adoption. In Ireland there are now 1.43 million TV households³, and it is estimated that there are at least 1.7 billion TVs worldwide⁴. In contrast, the widespread adoption of mobile phones took only about 10 years from the late 80's to late 90's. In Ireland there are now 4.27 million mobile subscriptions, and 2.5 billion worldwide.

The convergence of television broadcasting and video clip downloading with mobile technology promises to combine the content of television and the internet in a new and exciting manner while reaching out to the more widespread market of the mobile user. This could potentially be achieved within a couple of years with the right conditions as the main means of introducing mobile TV is likely to be through mobile users continuing to upgrade their handsets to keep pace with user demand for the latest technology. It is easier to introduce a new service as an 'add-on' than as a totally new service (see Section 6.4 on Packaging and Pricing). Other drivers of mobile TV could include competition between mobile operators, and changes in the broadcasting industry (see below).

Another important factor is that mobile operators with enhanced networks capable of carrying high speed/broadband data are seeking to increase revenues and value through advanced services. Such networks are capable of delivering mobile TV.

² The term 'repurposing' is often used in the broadcasting industry.

³ Source – Central Statistics Office Ireland

⁴ http://www.businessweek.com/magazine/content/05_06/b3919124_mz063.htm

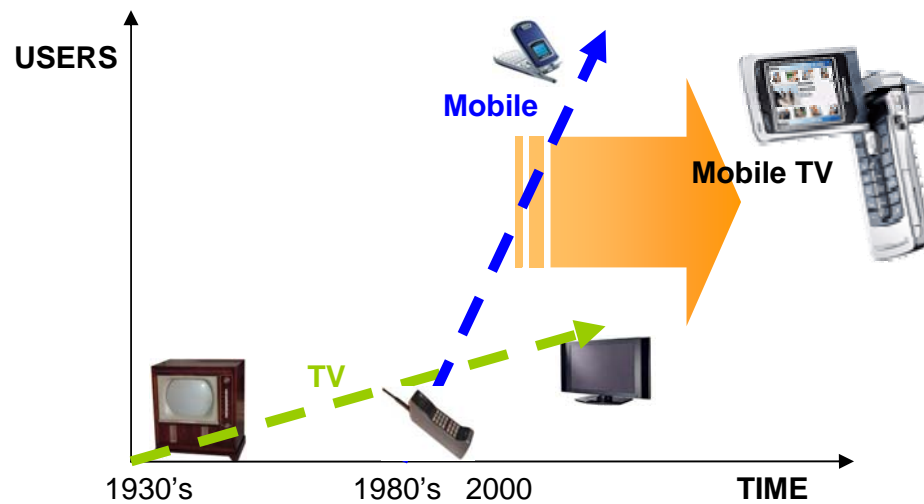


Figure 1. Timeline of the adoption of TV and mobile.

Changes in the Broadcasting Industry

The broadcasting industry in well-developed countries is currently in a state of transition from traditional analogue systems to digital systems. This represents more than a change of standards and equipment, as was the case in the changeover from black and white to colour. The growing transition to digital platforms means that digital television content is open to new forms of delivery (e.g. broadband), storage (e.g. Personal Video Recorders), and sharing (e.g. through the Internet). These all impact on how television is created, delivered, and viewed, with significant implications for the entire sector. Trends towards time-shifting⁵ and place-shifting⁶ are emerging. Other advanced features such as interactivity are changing how people watch and use TV.

2.1 This Note

In this briefing note mobile television is explored in terms of applications and value in Section 3, highlighting some of the ways in which mobile TV is expected to be used. Standards and technology for mobile TV are covered in Section 4, drawing comparisons between the main competing digital TV standards and systems being developed. In Section 5 market and commercial issues are explored with respect to the different players in the mobile TV sector. Finally in Section 6 we consider the key issues associated with the introduction of mobile TV, some of which are beyond the scope of ComReg's regulatory remit.

⁵ e.g. being able to watch programming at times chosen by individual consumers

⁶ e.g. being able to watch programming from more than one place

3 Using Mobile TV

Mobile TV is part of a broader shift in how people receive and use communications services, such as voice, internet, radio and TV. While the industry and technology is becoming more converged, users are integrating mobile and communications technology more into their lives, bringing about changing usage habits and lifestyle changes.

With the advent of mobile technology, communications devices are increasingly becoming centred on people, rather than places (i.e. the mobile phone which is associated with a person, rather than a fixed point in an individual's home or office)⁷. Mobile TV represents this evolution as it approaches the broadcast realm. Another way of looking at this is to consider how in a mobile, broadband, and people-centric world, content goes to people, rather than people going to content.

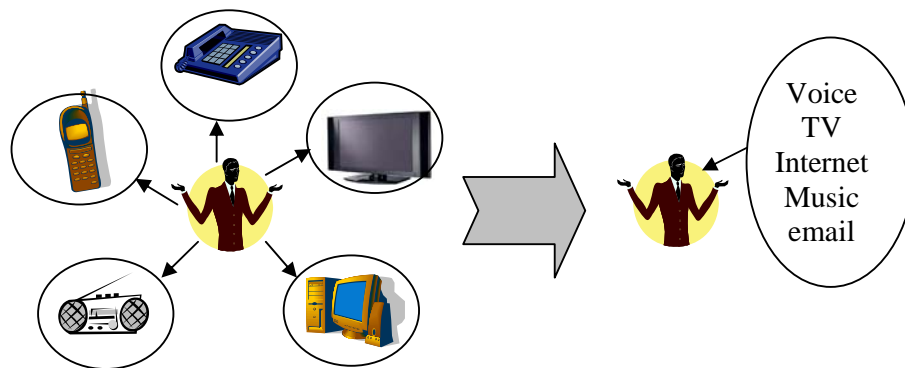


Figure 2. Device-centric to people-centric vision.

3.1 Applications

For mobile TV to be successful it is likely to be more than just regular broadcast TV adapted and sent to mobile devices. Content intended for mobile consumption will have to be specially created, accounting for consumer needs in a mobile environment (i.e. small screen size, infrequent and short viewing times). Interactivity is likely to be an important feature, particularly where services are being driven by mobile operators seeking additional revenue (see Section 3.3).

The convergence between the mobile and broadcast sectors is bringing about new applications related to both sectors (although not strictly broadcasting). For example, being able to use your mobile device to remotely control recording devices, to record your favourite broadcast TV shows without having to be at your TV or having to programme your personal video recorder (PVR) in advance (e.g. Sky + Remote Record). An extension of this idea is to be able to forward broadcast content onwards, via telecoms services, to a mobile device (e.g. a mobile phone or laptop computer).

⁷ See Ovum, "Multi-media mobility across devices", May 2006.

3.2 User Created Content

The proliferation of Internet and broadband technology along with digital photo and video recording devices (e.g. through camera phones) is creating a shift in the type of content being viewed by consumers. This trend emerged on the fixed internet with blogging, but is now moving beyond text and fixed usage. User created content is becoming increasingly important to news and media (i.e. first hand footage of incidents as they unfold recorded on mobile devices), and to social networking and entertainment (e.g. Bebo, YouTube⁸, Flickr, myspace, etc.). This is an interesting trend as it is being driven directly by consumer demand for participation.

3.3 Interactivity

Interactivity is where users are able to participate in TV programming by submitting content (e.g. images, video), making choices (e.g. voting), or by phoning in. More imaginative forms of interactivity are likely to emerge as the market develops. Highly interactive content is likely to develop for mobile platforms given the personal and interactive nature of mobile devices. This could cause a converging of TV broadcast and Internet message forums/blogging and instant messaging forms of communications changing the way consumers use and interact with TV. This is likely to go beyond just mobile versions of current interactive TV systems. The mobile industry is likely to bring more personalisation to mobile TV systems, with users being able to adapt the services and content that they want to suit them.

A trial of interactive mobile TV was held in Sweden (starting in December 05) by Ericsson and the Norwegian Broadcasting Corporation (NRK). It allowed users to watch, vote, chat and communicate with the TV presenter all using their mobile handset⁹. This trial showed that the addition of interactivity could double the time that viewers spend watching mobile TV. T-Mobile also announced that it will be implementing an interactive mobile TV solution to provide services in Europe (using Alcatel's 3G mobile interactive TV platform)

⁸ Google's acquisition of YouTube is an indicator of the potential importance of user created content.

⁹ See <http://www.ericsson.com/ericsson/press/20051202-090147.html>

4 Mobile Broadcast Technology and Standards

Mobile TV is part of an overall trend in convergence between broadcasting and mobile technology that is being driven in many cases by IP technology, and advanced systems platforms such as IMS (IP Multi-media Systems). Some key attributes of a mobile broadcasting technology are:

- Mobility of users: Wireless system must be able to operate in a dynamic radio environment (i.e. multipath, fading etc.).
- Device size: Handheld devices must be small to enable mobility, yet large enough to allow for an acceptable viewing area (typical mobile screen sizes: just over 6cm diagonal). Consumers expect small mobile devices, but will also require suitable viewing screens.
- Power consumption/battery life: TV screens can be heavy consumers of electrical power, limiting the battery life of a mobile device. Power consumption is therefore a key design factor.

Although technology is only one factor in a successful mobile TV service, the attributes listed above are likely to feature strongly in any successful offerings.

Mobile TV technology is available today operating to a number of competing standards. They mostly are based on existing digital broadcasting standards taking into account special requirements for mobile operation. The following sections describe some of the competing standards and technologies that are offering to deliver mobile TV to the end user.

4.1 Mobile TV content over 3G

Mobile TV services or services similar to TV are already available in many countries provided by 3G operators, typically operating in partnership with content providers/broadcasters e.g. Vodafone/SKY offering. This involves a mobile operator packaging content and delivering it as a data service over a 3G connection (e.g. video clips over MMS¹⁰). Although this enables mobile operators to start providing TV services without a major investment in new technology it is ultimately limited in terms of network capacity, since individual data streams must be sent across the network to individual users. Further pressure is likely on 3G networks as usage from other services increase (e.g. mobile Internet). The advantage here is that 3G infrastructure is already in place and handsets are already widely available. Many 3G networks are now being converted to HSDPA (High Speed Downlink Packet Access) with theoretical capabilities of delivering up to 14 Mbit/s. Pricing models for these services are still emerging, and it is yet to be determined whether this type of usage of 3G resources can be justified in terms of the revenue it can support.

Examples of this type of solution include Vcast (Verizon), MobiTV, GoTV (3G - Cellular solutions).

¹⁰ Multi Media Messaging.

TDtv – TDtv is a variant of mobile TV that uses 3G technology to deliver mobile TV services. It works with TD-CDMA technology as part of the Multimedia Broadcast and Multicast Standard (MBMS) - a part of 3GPP release 6. TDtv can deliver up to 50 channels of small screen TV, or 15 higher quality channels. This technology is being driven by US equipment manufacturer IP Wireless. TDtv can be delivered using 3G infrastructure with the addition of a Broadcast Multicast Service Centre (BMSC) which enables TDtv to operate together with other 3G services. However, operators must upgrade to 3GPP release 6 which could result in delays in delivering this technology. 3G handsets need additional functionality to receive TDtv. In the US, Sprint Nextel has invested in this technology. IP mobile in Japan and Orange in the UK will also trial the service. TDtv operates in unpaired 3G spectrum (1900 – 1920 MHz). Many European 3G operators already have licences for this spectrum¹¹.

Multimedia Broadcast Multicast Services (MBMS). This is part of 3GPP release 6. A dedicated data channel is not needed for each individual user in this system, just a single broadcast channel in each cell. Research by Analysys¹² shows how MBMS can significantly reduce 3G network capacity consumption where video services are available.

4.2 DVB-H

This standard is an evolution of the DVB-T (Digital Video Broadcasting - Terrestrial) standard for fixed broadcast digital TV. The DVB project (an industry led consortium – originally European, but now global) began work on the mobile aspect of DVB in 1998¹³. DVB-H is backwardly compatible with DVB-T as they use the same standard at the transmission layer, and the two systems can share the same spectrum. DVB-T is differentiated at higher layers. DVB-H uses IP for networking, which makes it flexible and compatible with overall trends towards IP networking, and next generation networks. A technical standard for DVB-H was formally adopted by ETSI in 2004¹⁴. Despite potential delays in the access to spectrum, DVB-H is currently considered to be the strongest contender in the standards battle. DVB-H+ is a hybrid technology that combines terrestrial and satellite transmission to deliver DVB-H. DVB-H services have been tested and launched commercially in a number of countries (see Section 6.5).

4.3 Digital Multimedia Broadcasting (DMB)

DMB is based on a digital audio broadcasting standard (Eureka 147), originally developed in Europe. Korean equipment manufacturers LG and Samsung are key drivers in DMB adoption. There are two main variants of DMB: T-DMB

¹¹ In Ireland Vodafone and O2 have been licensed in this spectrum, and there are still two blocks unassigned.

¹² Analysys Research “3G Multimedia Broadcast and Multicast Service (MBMS) has major advantages for mobile TV and video broadcasting”, October 2005.

¹³ The DVB project was formed in 1993.

¹⁴ European Telecommunications Standards Institute (ETSI) – standards EN302304

(terrestrial) and S-DMB (satellite). S-DMB relies on a combination of satellite broadcasts and terrestrial stations to boost coverage in urban areas where the satellite signal can be blocked by buildings. DMB uses MPEG4 protocols for video and has a return channel to provide interactivity. DMB is standardised by ETSI¹⁵ since July 2005.

4.4 Other Standards

Media FLO – This is a technology developed by US company Qualcomm. Technical specifications were published by the FLO¹⁶ forum in June 2006, and technical specifications were ratified by the Telecommunications Industry Association (TIA)¹⁷ in October 2006.

ISDB-T (Integrated Services Digital Broadcast – Terrestrial) – This system was developed for the Japanese market and uses a segment of the Japanese digital TV assignment.

DAB-IP – Digital Audio Broadcasting IP (Internet Protocol) uses DAB infrastructure to carry other IP services such as TV. This system was chosen by BT Movio for their wholesale mobile TV and radio offering in the UK. Other forms of DAB such as EDG are currently under development.

DXB/eDAB – Digital eXtended Broadcasting/extended Digital Broadcasting are examples of other standards being developed on a smaller scale¹⁸.

4.5 Video Compression Technologies

Video compression is a technique that enables digital video signals to be transmitted more efficiently, therefore requiring less capacity (i.e. less spectrum). The ITU¹⁹ H.264 standard is used for most systems. MPEG²⁰ standards (e.g. MPEG-4) are used for some systems and are likely to be used for more in the future (e.g. MPEG-2 is used for ISDB-T). Any coding system can be used with DVB-H. Because systems such as DVB-H and DAB-IP are IP based any application or coding system could be applied. Multiple codec standards are likely to exist side by side in user devices, which results in increased costs. Various different audio coding standards are used including the audio aspects of MPEG-4 (which is also a video standard).

¹⁵ European Telecommunications Standards Institute (ETSI) - TS102 427 and TS102 428.

¹⁶ FLO – Forward Link Only

¹⁷ A US standards organisation.

¹⁸ DxB is being developed by a consortium of companies including the Fraunhofer Institute, Germany.

¹⁹ International Telecommunications Union – www.itu.int

²⁰ Motion Pictures Experts Group

4.6 Future Developments

For the most part the future development of the mobile TV sector depends on the adaptation of people's lifestyles to mobile TV services. Key developments will be in the areas of:

- Multi-standard & multi-band technology
- Battery technology and low power/power saving techniques
- Screen and projector technologies
- Suitable content
- Digital rights management
- Conditional access systems
- Lifestyle changes

4.7 Summary

There are several strong competitive technologies emerging to deliver mobile TV technology. The various aspects of the technologies from a technical and business model perspective must be carefully considered by any operator seeking to deploy a mobile TV service.

	DVB-H	DMB	3G
Network Cost	Medium*	High* (almost 10 times more than DVB-H in UHF, 2 times more in other bands) ²¹	Low. Can make use of existing 3G technology
Equipment Availability	2006	2005	2005
Support for multiple users	Good	Good	Low
Support Multiple Channels	Good: 20 – 30 channels (in UHF), 9+ in S band	Medium – 12 channels (with 3 carriers)	Low to Medium: 6
Availability of Spectrum	Limited. Seeking spectrum from analogue TV	Yes	Yes

* Depends on spectrum band used. Also, the cost of spectrum may be a significant factor – 3G operators have already paid for their spectrum.

²¹ Source – Digital Video Broadcasting Project, "System Comparison T-DMB vs DVB-H", 2006.
www.dvb.org

5 Market & Commercial Issues

A good technology alone is not enough to make a successful service. Other factors such as user demand, competition from alternative products and business models are just as important as a product or service that works. The successful implementation of mobile TV is likely to require new business models from both the mobile and broadcasting sectors. Many of the key opportunities in mobile TV are likely to come from co-operation and partnerships between mobile operators and broadcasters. Partnerships are likely to be particularly important among smaller operators for whom it is not viable to roll out new networks. BT Movio in the UK is an example of a wholesale model of mobile TV service provision. BT Movio is providing a wholesale package of mainstream UK TV channels using DAB-IP technology. Virgin mobile is the first operator to offer the service there.

In addition to these issues, access to broadcasting content is a key issue for mobile operators.

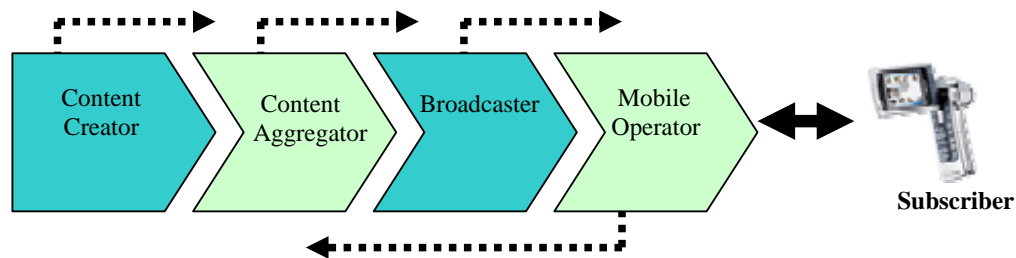


Figure 6.1: Mobile TV value chain showing how the various players could try to expand their influence through mobile TV.

5.1 Content Providers and Broadcasters

Content Providers

Standard TV content must first be adapted before it is suitable for mobile delivery. It needs to be redesigned to suit smaller mobile screens which typically have an aspect ratio of 4:3 (currently), whereas most content is now created for widescreen (16:9) viewing. On-screen graphics need to be redesigned to suit smaller screens. Arguably the best place for this adaptation to occur is as close to the source of the content as possible, maintaining the importance of the content provider's role in the mobile TV value chain.

The content itself must be presented in shorter segments for mobile viewing. This can take the form of mini episodes (Mobisodes²²) typically 1 to 3 minutes long, which are designed to generate increased viewing of the full length TV show. Mobisodes have been created for some popular tv series such as Fox's '24', ABC's 'Lost', and the BBC's 'Doctor Who'. Other content is being produced with mobile as the primary application (i.e. not just adaptations of regular TV). Comedy Time is

²² Mobisode is a trademark of the Fox Broadcasting Company

an example of a TV network formed to create and deliver content just for mobile TV (www.comedytime.tv). Mobile TV content packagers/service providers such as MobiTV (www.mobiTV.com) are now emerging just for the mobile market.

Broadcasters

Broadcasters have strong relationships and experience with content providers (many produce their own content). While being expert at delivering broadcast content to large subscriber bases, traditional broadcasters may initially lack experience in meeting the specialised needs of mobile consumers (e.g. interactive, or highly specialised content). In countries where there are already DTT networks, broadcasters would have a head-start in rolling out DVB-H services.

Key Choices for Broadcasters:

A number of options are open to broadcasters considering mobile TV. They could move to roll-out networks and introduce new handsets. While this requires serious effort, it would be a more difficult approach to just introduce a new mobile service and handset, as was done with ISDB-T in Japan with limited success. Another approach is for them to form partnerships with mobile operators, who are able to deliver broadcast services to their subscribers. Alternatively, broadcasters could package and sell their content to mobile operators who would then distribute this to their customers. Although this approach represents somewhat lower revenue potential per user, it probably offers the best chance of success.

5.2 Mobile Operators

For a mobile operator the provision of TV services is a potential additional source of revenue. Furthermore, the future of mobile TV services is likely to involve increased interactivity which could create further new revenue streams. Operators considering mobile TV must choose how they wish to deploy it (i.e. using existing 3G mobile technology, or adding a broadcast transmission technology). Difficulties in gaining access to content could obstruct mobile operators' plans²³.

Key Choices for Mobile Operators:

Operators could use easy to deploy extensions to their existing technologies, though this might limit the future potential of their service offerings. The advantage is that these types of solutions potentially give mobile operators more control of the services than other technologies that could be more influenced by the traditional broadcasting community. The approach requires 3G resources, which means that it is most suitable for delivering a small number of mainstream channels (which may or may not be a successful business model). Alternatively, operators could upgrade or build new networks with more advanced technology that can handle future needs. The downside is that this is more costly and could delay the launch of services. Operators could also choose to form partnerships with or acquire others who already

²³ In Korea, regulatory intervention is needed to ensure that SK Telecom is able to access content for its S-DMB service.

have broadcasting infrastructure and content production capabilities (e.g. 3 Italia's purchase of Canale 7)

Some mobile operators are already gaining valuable experience about mobile broadcasting by offering services over existing 3G networks (e.g. Vodafone Live/SKY). In some cases mobile operators may have been initially motivated to provide TV over 3G because they were experiencing low usage of their 3G networks.

5.3 Equipment Manufacturers

The mobile TV standards battle is being driven in many cases by equipment manufacturers such as Nokia (DVB-H), LG and Samsung (DMB), and Qualcomm (MediaFLO). Silicon designers and chip manufacturers in some cases are producing multi-standard chipsets, to cover as many bases as possible (e.g. Frontier Silicon's Paradiso chip).

With such a high level of mobile phone handset penetration, and a relatively short time for device replacement, it is possible for equipment manufacturers to integrate mobile TV technology into new handsets and have them enter the market on a wide scale basis relatively quickly.

5.4 Consumer Demand

A number of trials have been carried out to help determine potential user demand for mobile TV services (e.g. O2's trial in Oxford, UK²⁴). Key factors influencing consumer demand include usability, availability of content, and pricing and packaging of services.

Pricing and Packaging

The success of mobile TV services is likely to depend on their packaging and how they are priced. Adding mobile services as an additional bundled subscription seems to be the model emerging in early commercial deployments. A monthly subscription level of approximately €10 has been suggested as an acceptable level in consumer surveys²⁵, despite initially higher levels in some commercial offerings. However, due to the large number of post paid mobile subscribers a pre-paid subscription model may be difficult to apply to mobile TV. More advanced models with subscriptions to third party content providers may emerge in the future.

5.5 Early Deployments and Recent Developments

5.5.1 Early Deployments

DVB-H: 3 Italia and Telecom Italia launched DVB-H services in Italy in June 2006. 3 Italia did this after it acquired a digital TV broadcast licence by buying Italian broadcaster Canal 7 (La7), giving it access to the necessary spectrum.

²⁴ http://www.o2.com/media/press_releases/press_release_1298.asp?archive=yes

²⁵ <http://www.mobiletv-news.com/content/view/143/2/>

Trials have been carried out in Finland by Digita²⁶ and services will be launched in December 2006. A successful trial was carried out in Germany (initially for the 2006 FIFA World Cup), which may now develop into a commercial service.

DMB: Services were launched in Korea by SK Telecom in December 2005, and by June 2006 approximately 1 million end user devices (consisting of mobile phones, personal video players, digital cameras, car navigation systems and laptop computers) have been sold. SK Telecom has implemented the S-DMB variant which provides 11 video channels, 25 audio channels, 3 data channels (information services)²⁷.

There are currently some T-DMB trials running in Europe. A trial was carried out by Debitel and T-Systems in Germany for the 2006 World Cup. A trial has also been announced in the UK (Arqiva, BBC, BT Movio, LG Electronics, and Samsung).

Widespread deployment is planned in China in 2007/8, and is expected to be boosted by the 2008 Olympics in Beijing. Other standards such as DMB-T/H and MMB²⁸ are also being developed in China, which could potentially have a significant impact on the Chinese market as they would avoid intellectual property and royalty issues associated with using imported technologies.

DAB-IP: BT Movio has launched a wholesale DAB-IP service in the UK. Virgin Mobile in the UK launched a mobile TV service in October 2006 using BT Movio's DMB technology for video transmission²⁹.

MediaFLO: Limited trials announced with BSkyB in the UK, Version Wireless in the US and KDDI in Japan.

ISDB-T: Services were launched in Japan initially through a trial in 1998, and take-up is now strong. A national deployment of ISDB-T has been announced in Brazil.

5.5.2 Irish Trials

Ireland has a high take up of digital TV services compared with many EU member States – in Sept 2005 42% of all TV households in Ireland were digital subscribers. These digital services are provided via satellite, cable and MMDS. Combined with the level of mobile take-up in Ireland (103% at Q1 2006) there is a high potential for mobile TV services. Video download services are currently available through Vodafone's 3G mobile network.

A number of trials have been carried out or are planned:

²⁶ <http://www.dvb-h.org/Services/services-finland.htm>

²⁷ <http://www.sktelecom.com/eng/services/dmb/>

²⁸ Mobile Multimedia Broadcasting

²⁹ <http://www.electricnews.net/frontpage/news-9793683.html>

- The DCMNR is currently running a trial of Digital TV to test the DTT network. This trial is in its early stages³⁰.
- RTÉ trialled DAB-IP during the first half of 2006 which included mobile TV applications. BT installed the DAB-IP technology solution within the RTÉ network in May 2006, and successfully tested the service. The test DAB transmitter was located at Three Rock Mountain providing coverage to Dublin and parts of Kildare and Meath. A public demonstration event took place on a LUAS tram between Heuston Station and the Red Cow Hotel on June 9th.
- DVB-H was showcased by O2 Ireland during the 2006 Ryder Cup golf contest in Kildare. Both O2 Ireland and 3 (Hutchison 3G Ireland Limited) have been licensed by ComReg to carry out trials of mobile TV services in the Irish market.

ComReg issued a consultation in December 2005 on “Regional DVB in the UHF Band” that sought views on digital broadcasting including mobile TV broadcasting³¹, and a response to that consultation was issued in September 2006³². The outcome of this process is to continue to monitor developments and to engage with the Department of Communications, Marine and Natural Resources with regard to future spectrum resources that should be set aside for traditional broadcasting applications.

5.5.3 Recent Developments

Different levels of progress throughout Europe, and globally, are enabling new operators to learn from the experiences of others. However, the advantages of development on a pan-European or global scale take longer to emerge³³.

More trials and early commercial deployments are likely over the next couple of years as mobile TV enabled handsets make their way into the market through regular upgrade cycles.

5.6 Summary

It is likely that multiple standards and technologies will coexist as markets develop differently in different countries, and this is already evident from early trials and commercial deployments. The various aspects of the technologies from a technical and business model perspective must be carefully considered by any operator seeking to deploy a mobile TV service. Factors such as user demand and pricing and packaging of services are likely to be key elements.

³⁰

<http://www.dcmnr.gov.ie/Broadcasting/Digital+Television/Digital+Terrestrial+Television+Pilot/DTT+Pilot.htm>

³¹ <http://www.comreg.ie/fileupload/publications/ComReg0596.pdf>

³² <http://www.comreg.ie/fileupload/publications/ComReg0648.pdf>

³³ Radio Spectrum Policy Group “Opinion on The Introduction of Multimedia Services in particular in the frequency bands allocated to the broadcasting services”, May 2006.

6 Regulatory Implications

6.1 Regulatory Environment

The convergence of two separate industries brings together the policy and regulatory issues of both sides: the traditional regulation of broadcast media which is strongly focused on content (taste, decency, protection of minors etc.) and the telecoms sector where regulation tends to be more focused on market and economics issues. Both sectors also are regulated in respect of public service objectives; for example, the provision of news and current affairs on the one hand and the assurance of key telecommunications capabilities on the other hand.

As much of the policy and regulation relating to broadcasting revolves around content, advertising, and related user protection, it is beyond the scope of ComReg's remit – although ComReg maintains close working relationships with the relative bodies involved. However, important issues raised in the area of content that will affect the converged mobile TV landscape could need to be considered by ComReg. In Ireland, broadcast regulation is carried out by the Broadcasting Commission of Ireland (BCI) and the RTÉ Authority. The need, or otherwise, for regulatory intervention by any of these bodies will clearly depend on the extent to which issues arise, and where from, bearing in mind that this is an evolving picture in which separate competing infrastructures for mobile broadcasting as well as converged arrangements could emerge.

Regulatory intervention by ComReg (though not necessarily by other bodies) is likely to be lightest where the mobile TV industry is structured in the form of separate competing arrangements. That might also be the arrangement that most benefits consumers. However, one viewpoint is that the only economically viable way to deliver mobile TV services is over a single shared mobile broadcast network (e.g. Digita in Finland, or BT Movio in the UK), with capacity provided to service providers on these networks. This could potentially limit the level of differentiation between different service provider's offerings thus limiting choice to consumers – in Finland only one channel is available for customisation by each service provider, the other channels are all common. Furthermore there could be regulatory implications concerning the provision of access to wholesale services in this scenario. The availability of free-to-air and public service mobile TV broadcasts could potentially have regulatory implications (free-to-air mobile TV is available in Korea and Japan³⁴). The availability of differentiated services on a common mobile TV broadcast network would involve conditional access systems.

Spectrum related regulation could also be necessary, in term of frequency management for both the mobile and broadcast sectors.

6.1.1 Content Regulation

The EC "TV without frontiers" (TWTF) directive is being modified as the Audiovisual Media Services Directive to widen its scope to include non-linear

³⁴ Free-to-air programming would also be available to non-mobile/cellular consumers, i.e. services on devices such as personal media players etc.

content (e.g. downloadable/not live content), while at the same time simplifying the regulatory framework, and increasing flexibility for all services including linear services. The current draft explicitly refers to co- and self-regulation. However, there are some fears that a widening of the scope of content regulation could adversely effect growth in the area of user created content³⁵. Linear content refers to traditional broadcasting where programming is transmitted in a single linear stream (e.g. live broadcast TV). Non-linear content refers to on-demand services (e.g. video on demand) or time staggered services.

In the mobile industry Digital Rights Management (DRM) has been tackled in a standardised open way through the Open Mobile Alliance³⁶, enabling increased interoperability and compatibility between operators, device manufacturers and content providers. This approach could potentially be leveraged by converged mobile TV providers. Generally DRM is a challenge for traditional content providers as they make the transition to digital delivery mechanisms.

6.1.2 *User Protection*

User protection is a key feature of the TVWF directive and now the Audiovisual Media Services Directive. As with many new services, it is likely to be far more profitable (per user) for an operator to deliver mobile broadcast services in a well populated urban area, than in a sparsely populated rural area. This could potentially lead to a new form of digital divide, particularly if trends in content development shifted towards mobile content.

6.1.3 *Conditional Access*

Conditional access is a method of providing differentiated services over a single shared resource. It works by encrypting³⁷ the broadcast information so that only authorised subscribers can decode and view the services. In this case, the conditional access provider acts as a content aggregator, possibly on behalf of a number of service providers. Technology choices must also be made concerning conditional access systems. If persistent bottlenecks or monopolies arise in such scenarios, these could have a detrimental impact on the development of services, on service providers or on consumer satisfaction, possibly leading to a need for regulatory intervention.

6.1.4 *Requirement for a TV Licence*

Two thirds of the countries in Europe, half of the countries in Asia and Africa, and 10% of the countries in the Americas and Caribbean have TV/broadcast receiver licence schemes³⁸. It is generally considered that if mobile TV content is broadcast live – or near-live – then the handset must be covered under a TV licence. In these

³⁵ www.timesonline.co.uk/article/0,,13509-2407359,00.html

³⁶ www.openmobilealliance.org

³⁷ Encryption is a technique to 'scramble' information or make it un-viewable without the correct decoding equipment and authorisation codes. It is commonly used on pay-TV systems.

³⁸ Source: <http://www.museum.tv/archives/etv/L/htmlL/licensefee/licensefee.htm>

cases most user's handsets would be covered under a TV licence for their household. Users who only access content that is downloaded, i.e. not broadcast, would not require a TV licence in that situation. Statements outlining this situation have been made in countries such as the UK and Germany. In Ireland, TV licensing is administered by An Post.

6.2 Radio Spectrum

One of the biggest issues facing the mobile TV industry internationally is the availability of sufficient spectrum. It is not clear if the current GSM and 3G networks are able to support the wide scale take up of mobile TV broadcasting while maintaining the quality of service to telephony users. In order to overcome this problem it may be necessary for mobile TV broadcasting to be delivered in spectrum other than that assigned to GSM and 3G services. While some systems can operate in currently unused spectrum bands others are targeting spectrum they expect to be released following the switch-off of analogue TV systems.

Regional Radiocommunication Conference 2006 (RRC-06)³⁹ took place in Geneva from the 15th of May 2006 until 16th of June 2006. At this conference a frequency plan and treaty were developed and agreed between 104 countries around the world including Ireland for digital broadcasting (VHF Band III and UHF Band IV/V⁴⁰). Ireland has eight national DVB-T multiplexes in UHF Band IV/V, while VHF Band III is mainly planned for T-DAB (Terrestrial – Digital Audio Broadcast) - Ireland has agreement for one national multiplex for DVB-T (Digital Video Broadcast – Terrestrial) in this band. The use UHF Band IV/V or VHF Band III for mobile television type services may be possible once national Digital Terrestrial Television (DTT) requirements have been identified. This is currently being considered by the Department of Communications, Marine and Natural Resources (DCMNR).

6.2.1 Frequency Bands

DVB-H: In most European countries, plans are aimed at 6-7 DVB-T multiplexes (8MHz) in the UHF band, which potentially leaves one or two for DVB-H. Up to 60 channels is possible per multiplex, although approximately 20 good quality channels would be more typical, from 4-5Mbit/s of usable payload. The delay in the availability of spectrum for DVB-H is currently its biggest challenge.

In order for services to be used in UHF Band IV (see Table 7.1 below), analogue TV must first be switched off. DVB-H could also work in broadcasting Bands III and V. Another option is the S-Band (2.17-2.2GHz) (also 1.98 – 2.01GHz), which is adjacent to 3G spectrum, and equipment is being developed to work in this band (e.g. Sagem Communications⁴¹). In the US spectrum at 700MHz is being used for DVB-H (as well as MediaFLO).

³⁹ http://www.itu.int/newsroom/press_releases/2006/11.html

⁴⁰ Currently analogue television uses VHF Band III and UHF Band IV/V.

⁴¹ See http://www.alcatel.com/vpr/?body=http://www.home.alcatel.com/vpr/vpr.nsf/DateKey/14022006_1uk

Broadcasting Band	Lower Limit	Upper Limit
III	174 MHz	230 MHz
IV	470 MHz	582 MHz
V	582 MHz	862 MHz
L-Band	1452 MHz	1492 MHz

Table 7.1 – Broadcasting bands targeted for mobile TV.

DVB-H has also been trialled in the at 1.6GHz by Crown Castle (in association with Intel) in the US. In Europe this band is assigned for DAB. DVB-H is also targeted at some 3G bands (TDD bands).

DMB: VHF Band III is already available for DAB in Europe, and could therefore accommodate DMB. DMB is also possible in the L-Band, although this would require a higher density, and therefore more costly, network. DMB uses a 1.5MHz channel delivering about 1Mbit/s of usable payload. This means about 8-9 channels of video (at 100kbit/s – i.e. not high quality).

6.2.2 Digital Switchover

At RRC-06⁴² a harmonized date for digital switch over was set at 2015 for most countries and Ireland is taking important steps to keep pace with these developments⁴³. The European Commission had previously set a target date of 2012 for analogue switch off for all member states. When terrestrial broadcasting switches to more efficient digital technology some of the spectrum previously used for analogue TV may become available for other uses. This is commonly known as the digital dividend. Some of this spectrum could potentially be allocated for mobile TV services such as DVB-H.

6.2.3 Spectrum Strategy

Key decisions in terms of spectrum allocation need to be made by national administrations. This is particularly difficult when development of the standards (and therefore the spectrum requirements) remains so unclear. Administrations must encourage innovative applications of technology and services while at the same time taking advantage of the benefits of a harmonised allocation. In some countries the implementation of mobile TV technologies would require some deviation from previously agreed international frequency plans, which would introduce additional delays in roll-out.

Other difficult decisions in spectrum planning involve anticipating the potential size of the markets for mobile TV services and how many operators need to be supported. In some countries the administrations may need to consider more flexible and

⁴² ITU Regional Radio Conference 2006.

⁴³

<http://www.dcmnr.gov.ie/Press+Releases/Minister+Noel+Dempsey+Announces+Launch+of+Digital+Terrestrial+Television+%28DTT%29+Pilot+in+Ireland.htm>

service neutral schemes to allow the development of mobile TV and other advanced wireless multi-media services.

Within Europe there is a move to harmonise one or more spectrum bands for multimedia service applications. This would have the affect of creating a larger market for consumer equipment that is manufactured for a regional market, as opposed to just a single country. One of the key bands under consideration is the L-band (1452 – 1492 MHz) which was set aside for T-DAB under a multi-lateral European treaty⁴⁴ and has not been used in a majority of European countries.

6.2.4 Test and Trial Licence Scheme

Service providers interested in developing technology or services in the area of mobile TV can be facilitated in Ireland under ComReg's Test and Trial Licence Scheme. This enables technology tests and limited commercial trials to be carried out. For further information see ComReg document 05/35.

⁴⁴ Final acts of the CEPT T-DAB Planning Meeting, Maastricht, 2002, for the revision of the Special Arrangement of the European Conference of Postal and Telecommunications Administrations (CEPT) relating to the use of the bands 47 – 68 MHz, 87.5 – 108 MHz, 174 – 230 MHz, 230 – 240 MHz and 1452 – 1492 MHz for the introduction of Terrestrial Digital Audio Broadcasting (T-DAB), Wiesbaden, 1995, as revised by the CEPT T-DAB planning meeting, Bonn, 1996

7 Conclusion

Mobile TV is driven by and is driving convergence between the mobile and broadcasting sectors. This is occurring as a result of the adoption of digital technologies by both sectors, making it easier for content to be distributed on networks other than traditional broadcasting networks.

Mobile TV services are now emerging that enable users to receive broadcast TV and download services on mobile handsets. In many countries these are either under trial or are already deployed in commercial systems (e.g. Italy, Korea). Significant growth is expected by many industry analysts to drive mobile TV services to high levels of adoption over the next few years.

New ways of delivering TV (i.e. mobile) have implications for the types of content needed. Mobile users require shorter programmes (typically a couple of minutes), and content that is adapted for small screen sizes. This is leading to the adaptation of content made for traditional TV and also the emergence of content providers specifically targeting mobile applications. From a users perspective, mobile TV is just part of a change in lifestyle for the many who are increasingly incorporating mobile and communications technology into their lives.

Mobile TV is emerging simultaneously with a number of competing technologies (i.e. DVB-H and T-DMB being the main ones). It is possible that no one standard will win outright over the other and that multiple standards will co-exist, spread across different markets. A convergence between broadcasting and mobile sectors primarily involves broadcast and mobile operators, either working in partnership or using converged technology solutions. Content providers will also play an important role in this.

Aside from market developments, the availability of spectrum will play a key role in how mobile TV develops. In particular any spectrum dividend from the move to digital broadcast TV is likely to play a key role in the development of mobile TV services. Some regulatory issues could arise if mobile TV services are provided via a shared single broadcast infrastructure using conditional access systems.

At ComReg we hope to see the development of competitive commercial mobile TV services in Ireland bring a greater choice of services to Irish consumers. Initiatives such as the 'Test and Trial Licence Scheme' (Ref. ComReg 05/35) and the 'Regional DVB in the UHF Band' Consultation (Ref. ComReg 05/96) are aimed at encouraging such developments.

8 Annex 1 - Comments on this Briefing Note

ComReg welcomes any comments or views on this Briefing Note. Comments should be sent to:

Jonathan Evans
Commission for Communications Regulation
Irish Life Centre
Abbey Street
Dublin 1
Ireland

Tel: +353 1 8049709 Fax: +353 1 8049671
E-mail: jonathan.evans@comreg.ie

to arrive on or before Friday 19 January, 2006.

Comments will be reviewed by ComReg when carrying any out further work on issues covered in this Briefing Note. In submitting comments, respondents are requested to reference the relevant section of this document. Responses will be available for inspection by the public on request. Where elements of any response are deemed confidential, these should be clearly identified and placed in a separate annex to the main document.

Disclaimer

This document does not constitute legal, commercial or technical advice. The Commission for Communication Regulation is not bound by it. This document is issued without prejudice to the legal position of the Commission for Communications Regulation or its rights and duties under relevant legislation and does not form part of any formal tender process.

This document is for information purposes only and is not intended to give any indication of ComReg policies, current or future, relating to any of the issues raised, or to any alternative technologies not included here.