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THE FUTURE USAGE OF THE BROADCAST SPECTRUM

INTRODUCTION

The debate on what to do with the refarmed terrestrial broadcast spectrum is beginning across Europe. The UK is well positioned to take a leading role. While we support 'flexibility', at this stage in terms of what could be envisaged in the planning of the transition from switch-on (Digital TV), to switch-off (Analogue TV) and the likely spectrum that my be released, some idea of the potential uses of the released spectrum is required.

Intellect wishes to engage in a debate with Ofcom, UK Government and the wider industry on the approach towards switch-off and the 'options' for the use of the released spectrum. This has to be within the context of a harmonised Europe wide approach.

Intellect's policy is to address broadcast spectrum as a strategic issue. The belief is that broadcast applications of many different natures will play an important and strategic role in the future of consumer services.

Intellect is examining the future usage of broadcasting spectrum, including projections for new broadcast-delivered services. This will lead to an understanding of the spectrum requirement (both capacity and bands) to accommodate reasonable assumptions about the existing and new services. This will determine whether there will be too little, enough, or too much spectrum for these services when analogue terrestrial television is switched off in the UK on completion of digital switchover.

BACKGROUND

Since the launch of digital television in the UK in 1998, the take-up of digital television has been rapid. At the beginning of 2004 50% of UK homes are now receiving digital television, albeit 7½ of the 12½ million digital homes are using Satellite as subscribers of BSKyB.

The Digital Television Action Plan, a partnership between Government and industry, envisages a decision in Q4/2004 to initiate a rolling regional switchover to digital terrestrial television (and the switching-off of analogue terrestrial television) to begin in 2007 and complete in 2010. This timetable may be delayed but it is Government policy to achieve digital switchover as quickly as possible within self-imposed constraints necessary to protect consumer interests.

On current planning, it is expected that 14 channels currently used for analogue terrestrial television will be available for other uses. Full details can be found in the DTV Action Plan. It is believe that the released spectrum can only be used for other broadcasting purposes under current international law. European harmonisation is ongoing and this needs to be borne in mind.

AIM

The aim of this paper is to identify the future needs and uses of Broadcast Spectrum in the UK, taking account of additional spectrum being released after digital switchover has been achieved.

SCOPE

The timeframe under consideration is 2004 to 2014. Some technology applications beyond that are also included but there are difficulties in looking much beyond ten years.

These considerations cover television, teletext, radio and any future "broadcast" services and is focused on terrestrial broadcasting and the spectrum relevant for that.

Issues will be raised which could affect the current Switchover Plan.

ASSUMPTIONS

The following assumptions apply: -

a. Digital Switchover is currently planned to complete by end 2010. This requires a decision and announcement in Q4/2004.

b. According to current DTV Switchover spectrum planning, 14 analogue terrestrial channels will be available for other (digital) broadcast purposes after Digital Switchover.

c. The current definition(s) for broadcasting will probably continue.

d. Allocation of broadcast spectrum must be seen in the context of a strong European and global approach.

e. Innovation services may require some adjustment to the current Switchover Plan.

DEFINITION OF BROADCASTING

The ITU defines the Broadcasting Service (Article 1.38 of the Radio Regulations) as: -

> "A Radiocommunications Service in which the transmissions are intended for direct reception by the general public. This service may include sound transmissions, television transmissions or other types of transmission."

Further research is necessary but meanwhile the ITU definition provides a traditional view, which will need testing in light of some of the new services, which might be introduced exploiting emerging technology.

POSSIBLE USES OF THE SPECTRUM AFTER DIGITAL TV SWITCHOVER

In a paper given by the Radiocommunications Agency to the DTV Stakeholders in April 2003, reference is made to potential uses of the Spectrum as follows:-

a. Uses that do not require any changes to the current Radio Regulations for co-primary use such as:

- More Fixed Reception Broadcast Multiplexes
- Portable and Mobile Broadcasting Multiplexes
- Quasi-Telecomms/Converged Uses

b. Uses that require changes to radio regulations for co-primary use such as:-

- Interactive Broadcasting on a Primary Basis
- Public and Private Mobile and Fixed Telecomms Networks

c. Uses that will remain secondary in International terms such as:-

- Interactive Broadcasting on a Secondary Basis
- Programme-Making
- Radio Astronomy

POSSIBLE NEW SERVICES

The following categories of new services are being considered by Intellect:-

a. More TV
HDTV
More Standard Definition Services
Local TV

b. Interactive Broadcast
Programme related (EPGs, etc.)
Service Based (eGov. eHealth, eTourism, Gambling, Video-Clips)
Mixed with Broadband (personal shopping, banking, etc.).

c. Mobile TV
Handheld (National or localised)
In Vehicle

d. Other Services
T-DAB Radio
Other Digital Radio
Information Services

As assessment of the Spectrum needs and Business case for each of the above (a to d), needs to be worked out.

In view of the rate of progress of technology, Intellect believes it is unwise to be too prescriptive and we further believe that new technologies are likely to emerge within the timescale of the next ten years, which will radically change the thinking. Intellect has, therefore, concentrated on exploring services that are typical of types that will be practical and will have both consumer attractiveness and realisable business models.

Issues that also need further study include the impact of Ultra Wideband and Frequency Agile Transmission/Reception. An objective assessment is needed of possible disruptive technologies.

PROPOSALS FOR TYPICAL NEW SERVICES

High Definition (HDTV)

There are good reasons to expect that a desire for HDTV will develop. Higher Definition DVD players will soon be available. Current DVD discs already give a higher definition picture than current DTV broadcasts. Consumers, generally seek improvements in quality of their entertainment delivery systems (albeit, at low cost). For family viewing, there is a trend towards larger screen sizes and this is likely to be accelerated via flat panel displays of all types.

The timetable for the introduction of HDTV is more difficult to predict. Nonetheless we can make some reasonably clear predictions about the technical implications. We can expect that the spectrum requirements for HDTV will be double that of Standard Definition (SD). As Digital Terrestrial Television (DTT) is still in the early phase, it is unlikely that there will be a major demand for HDTV at the very least, until switch-off starts.

The business case for HDTV depends primarily on the broadcasters, some of whom are already investing in HD Production, which they can sell to overseas broadcasters. However, they would be reluctant to invest in transmission infrastructure and provide the necessary bandwidth. But, they currently have to invest in new equipment for the start of DTT. So it may be the next round of investment before the mass-market broadcasters up-grade to HD.

Therefore, it is more likely that HDTV may be a practical proposition for broadcasters in the 2009-2011 time frame.

Telecomms-Based Broadcast-Related Interactive Services

Spectrum released could be used in ways that complement both traditional TV broadcast services and the personalised point-to-point services offered over the fixed and mobile networks. New applications in released spectrum could create wholly new markets.

The potential for these markets needs to be tested, and thorough market exploration would be beneficial. As an example, the released spectrum might be used to deliver exciting, engaging and useful broadband content to fixed, portable and mobile terminals in "local" service areas.

There are consequential opportunities for technical innovation. Manufacturers are already exploring multi-platform terminals with multiple air interfaces for digital broadcasting, cellular mobile and wireless LAN (including hot spot IP access and home networking applications).

For anything new that could blend the best of TV with broadband's interactivity, careful consideration must be given to the requirements for interactive capabilities. New consumer content markets can be envisaged as it is likely that fully interactive services are of more personal interest (and indeed, in the case of banking, shopping, education, etc. private), to individual users, the potentially wide scope of the interactive broadband content really implies that access could be required in more places than just the home. Portable devices, and hence mobile-enable broadband delivery, would be the likely general requirement.

In addition, it is important to consider the concept of in-band return channels for any new interactive services, which could ensure available and consistent bi-directional coverage.

Broadcast-Related Interactive Services

Interactive TV is not new; Teletext commenced in the 1970's. Return path technology has emerged more recently and industry aims to differentiate and capitalise on new opportunities, add functionality and grow from a passive to an active experience for the consumer.

Interactive services provided by digital television generally fall into two areas:-

- Broadcaster driven enhanced television such as Electronic Programme Guides (EPG), Personal Video Recorders (PVR) and interactive video.

- Industry driven services such as on-line information, local what's on, e-tourism, e-commerce and e-Government.

Such services could be for home and office, but spare off-peak capacity could be used for the transfer of data for business use. Revenue could be generated, inter alia, from Pay-Per-View features and major TV events backed up within online purchase of relevant merchandise.

It might well be that such services would provide a viable business case which would justify current traditional broadcaster(s) applying for an additional multiplex (s); or for a 'new' terrestrial broadcaster to apply to offer digital service(s).

The service(s) could be Pay-TV or Free-To-View.

The additional spectrum could be used for "more of the same" channels or for a range of services, including High Definition, Interactive, and Mobile TV or to enhance coverage/improve reception of some existing services and introduce new services.

Mobile TV

The convergence of digital media and communication gives users the opportunity to access most digital content in a mobile environment. DTT is ideal for TV broadcasts (also games,

video clips, audio files, data) to hand-held devices (PDAs/mobile 'phones), In-car systems (bus, train) portable TVs or handheld devices.

It would allow the distribution of television, music, video or other multimedia content to a large audience through mobile devices. Content could be adjusted on a regional or even "cellular basis.

Other Services

DAB

DAB products are becoming affordable and there is likely to be a major upsurge of interest in these services in the coming years. This could lead to a second switchover project for DAB.

This would again change spectrum usage. It is important that if digital radio demand grows - it should not be stifled by non-availability of spectrum.

Teletext

Interactive services, in general are dealt with elsewhere. We must not forget the existing Teletext-type service, which attracts a substantial viewership. The current spectrum (data capacity) allocation for Teletext services is barely enough to create a modern equivalent to the analogue service. Spectrum is required if this service is not to be denied to the consumer.

CONCLUSIONS

Re-farming, re-allocation or re-use of current broadcast spectrum following the switchover to digital TV transmission is some way off. In the intervening time there are a number of somewhat unpredictable variables. In particular technology, business models, PSB requirements and consumer desires may all undergo major or minor changes within the timescales relevant to this re-farming.

Due to the unpredictable nature of some of these variables we consider it is impossible to be prescriptive about the exact applications of spectrum, which will be successful at a time some 4 to 10 years into the future.

There are many possible uses of the potentially freed up spectrum. This paper examines a number of these to provide examples of the type of new uses to which the spectrum could be put.

Each of these types of use will have different business models and provide a different balance of societal, economic and spectral values.

There are more than enough broadcast related applications to occupy this and yet more spectrum. Whether there are appropriate and viable business models and plans to cover all these applications is as yet indemonstrable.

HDTV, if implemented according to current practice, would occupy most of the released spectrum (alternative strategies such as SFNs and/or new compression mechanisms may be appropriate).

Further and more detailed consideration of all aspects will be necessary as the spectrum becomes available.

Some opportunities are only viable with careful harmonisation across the whole country and even across to nearby European Member States.

Some of the options for future use of the spectrum will not be possible under the current release plan. If those options are to be opened up a major reformulation of that plan would be required. Our view is that Ofcom needs to consider whether these wider options will form part of its future plans.

Decisions made now and/or at a later time will have implications for many years and will impact the viability and continuity of both public service broadcasting in particular and digital TV broadcasting in general.

RECOMMENDATIONS

1) First priority for re-use of any spectrum freed-up by the switch-over from Analogue Terrestrial TV to Digital Terrestrial TV should be given to broadcast related services which extend the broadcast-based services offering in directions which attract consumers and which support realistic business models.

2) A wide range of examples is included in this document to illustrate the various characteristics of such “extension” services. Much work will be necessary at the appropriate time, to decide on suitable business models. This is the responsibility of Companies interested to use the spectrum but Ofcom needs to understand the “boundaries of realism” which will determine the levels of interest and must provide sufficient time and information for industry to make wise decisions.

3) Nothing should be done in the field of spectrum re-organisation to damage or delay the switchover to Digital TV, through creating uncertainty, delaying investment or damaging the business models. This could only have the effect of delaying the switchover, which will damage both the DTV scenario and delay any availability of freed spectrum. So both the incumbents and the new entrants will be disadvantaged (along with other sectors of the broadcast related industry such as manufacturing, content providers, aerial installers, etc.).

4) Attention must be paid to other broadcasting needs (beyond TV) such as digital radio services.

5) If Ofcom wishes to contemplate more fundamental changes of use of the freed spectrum, consideration of the changes and full implications needs to start now, otherwise the die will be cast and, for example, necessary changes to the spectrum planning will have become impossible.

POSSIBLE USES OF RELEASED ANALOGUE TERRESTRIAL TV CHANNEL

SERVICE	SPECTRUM IMPLICATIONS	BUSINESS CASE	TIMESCALE	COMMENTS
High Definition TV	2-3 SD Channels by 2010	Would be viable as Pay-TV for viewers.	Broadcasters would not be ready nor compression technology available before 2010.	High Probability HDTV on Satellite and Cable will be inactive.
Another MUX for terrestrial broadcasters and/or interactive services from a Broadcasters' perspective.	A minimum of 5 channels. Depends on level of interactivity.	Broadcast would have to offer new services. Revenue could be generated from a number of sources.	After switchover unless existing service(s) were replaced with these.	Possible. Return Path? Modem?
Interactive services from Telecomms.	Small if association with broadcast stream; large if carrying video content.	Provision of high quality Broadband content to fixed, portable and mobile terminals.	Probably have to wait until after switchover.	High Probability of this or a variant.
Mobile TV	Depends upon scale of service and transmission format.	DTT is ideal for use of the move to receive games, video clips etc.	Probably have to wait until after switchover but some may be available now.	High Probability.