



Mobile TV

— results from the BT Movio DAB-IP pilot in London

Emma Lloyd and Ross Maclean

BT Movio

Andrew Stirling

Larkhill Consultancy Limited

Later this year will see the launch of BT Movio, which will be the first commercial mobile broadcast entertainment service to launch in Europe, enabling mobile operators to offer consumers a reliable live digital TV and radio service on their mobile phones. The service will be broadcast using the DAB digital radio network.

In order to prove the viability of the service prior to launch, BT undertook a pilot with a representative sample of 1,000 users in the London area. This article outlines the results of the pilot – the largest of its kind undertaken in Europe – and what this means for the future of TV-to-mobile services.

The results of this pilot are extremely promising for the future of mobile entertainment services and demonstrate that users value a mix of TV and DAB digital radio services. At a conceptual level, mobile TV is seen as an exciting and attractive service that is part of the natural progression of mobile technology. This was conclusively borne out by experiences during the pilot, with more than half of the users finding the service appealing or very appealing. Interestingly, the appeal of the service was not found to be limited to specific sections of the sample user base, but rather that the appeal was spread across a broad section of demographic groups. There was strong evidence that users valued having the mobile broadcast services:

- Over a third of users said that they would be prepared to switch mobile network provider in order to get the services;
- Around two-thirds of pilot users were prepared to pay up to around £8 (€12) per month for the benefit.

Travelling and commuting were expected to be the key activities when mobile TV would be used but a surprising finding from the pilot was that a significant proportion of users used the service at home most often.

The pilot also successfully demonstrated that the new DAB **Enhanced Packet Mode** (EPM), in conjunction with an Internet Protocol (IP) application, is fit for the purpose and enables a flexible platform architecture to be created rapidly¹. Importantly, it also leaves open the option for mobile operators to adopt new bearers at a future date. Reinforcing this rapid-launch advantage, DAB-IP enables mobile TV to share multiplex capacity with DAB digital radio services and therefore allows

1. Hereafter in this article, the DAB/EPM/IP platform used by BT Movio is referred to as “DAB-IP”.

operators to benefit from the considerable DAB spectrum and infrastructure investments that have been made across Europe.

Pilot design

The pilot had two key objectives. The first was more technical with the aim of proving the DAB-IP platform concept. The second was aimed at gauging interest and reaction to mobile TV – through recording and analysing usage patterns, preferences for content and services and propensity to pay for such services – in this new market.

The pilot began at the end of June 2005 and ran through to the end of December 2005. For the first month, a small sample of devices was given to more technically able users to ensure the technology worked and was fit for the purpose. The remaining devices were then distributed to the main group of pilot users from August onwards.

As an incentive for participating in the pilot, users were given £30 credit per month to cover calls and texts. Due to the design of the pilot handsets, it was not possible to gain access to the SIM card within the device, so users were given phones which were pre-loaded with a SIM card. This meant that these devices were essentially a second phone during the pilot and this should be borne in mind when considering the results from the pilot. Although a significant number of users did adopt the pilot phone as their primary device during the trial, a number of users were carrying around two phones or only using the pilot device on a more limited basis. With this factor taken into account, the results are particularly encouraging.

The user sample was demographically varied, with an equal split of males (M) and females (F) and a wide range of ages, technological ability and existing mobile spending patterns (see Fig. 1). BT drew on the expertise of Basis Research to conduct the study and manage both the collation of the findings as well as the recruitment of the pilot users. The research undertaken during the pilot used a mix of quantitative and qualitative methodologies. Firstly, the quantitative research – which helped to form an assessment of usage patterns and how these changed as users became accustomed to the service – consisted of two waves of telephone interviews:

- Wave 1 (W1) – conducted two weeks after users received their devices (capturing initial reactions to the service);
- Wave 2 (W2) – conducted two to three months after receiving the device (by which time the participants were using the service in a more realistic manner).

Participants were existing users from a range of network providers. All participants were recruited independently by BT. Virgin Mobile provided SIM cards and network capacity.

Secondly, the qualitative research – which enabled exploration of the reactions to the service, the drivers influencing usage patterns, and the service expectations and preferences – was conducted in two ways:

- 25 participants were selected for one-hour face-to-face interviews in usage situations such as at home or whilst commuting;

	W1 (n=307)	W2 (n=442)
Gender		
Male	49%	52%
Female	51%	48%
Age		
16 to 24	37%	36%
25 to 34	38%	36%
35 to 50	24%	28%
Payment method		
Contract	31%	33%
PAYG	69%	67%
Average existing user Spend per month		
£10 to 20	27%	30%
£21 to 30	27%	24%
£31 to 40	21%	23%
£41 +	24%	23%

Please note:

- The data have been weighted
- 197 respondents participated in both waves

Figure 1
Sample composition of quantitative interviews

- Participants for six two-hour focus groups were recruited, with around eight to ten users each time, openly discussing their views and pilot experience to date.

Technical details of the platform

The pilot offered a broadcast mobile TV service via the national commercial DAB digital radio multiplex, Digital One (D1).

DAB-IP proved its capability to enable early rollout of mobile TV

BT Movio's TV-to-mobile service is broadcast using DAB-IP, a term used here to refer to a set of DAB standards, published by ETSI, that enable Internet Protocol (IP) transport over DAB. BT Movio has harnessed this IP interface to allow it to design a service platform which is independent of the bearer technology (i.e. DAB) and can support a wide range of services and applications.

One of the key standards on which DAB-IP rests is the **Enhanced Packet Mode** (standardized by the WorldDAB Forum), which enables video and other services – that are more sensitive to errors than the native audio services carried by DAB – to be carried.

Unlike other DAB-based mobile TV standards, DAB-IP can share multiplex capacity with DAB digital audio services. This enables operators to use spare capacity on DAB networks to start offering mobile TV without waiting for new spectrum to become available and networks to be rolled out.

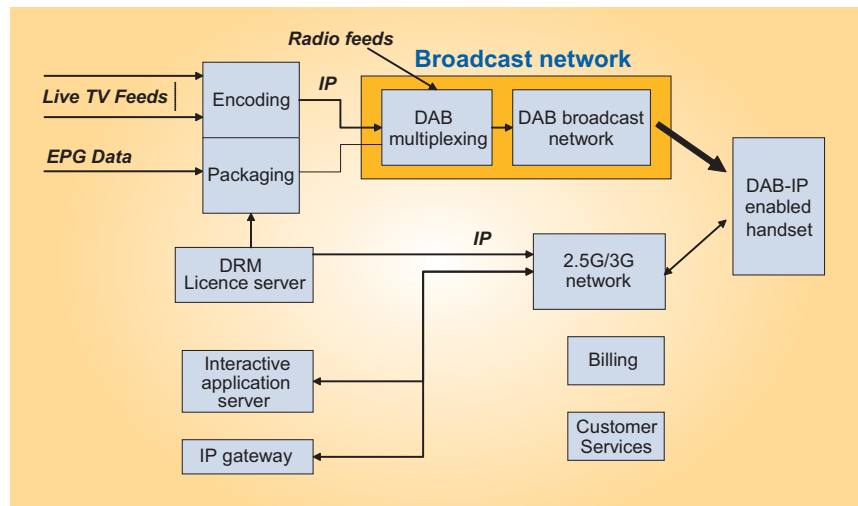


Figure 2
Simplified schematic of Pilot Platform Architecture

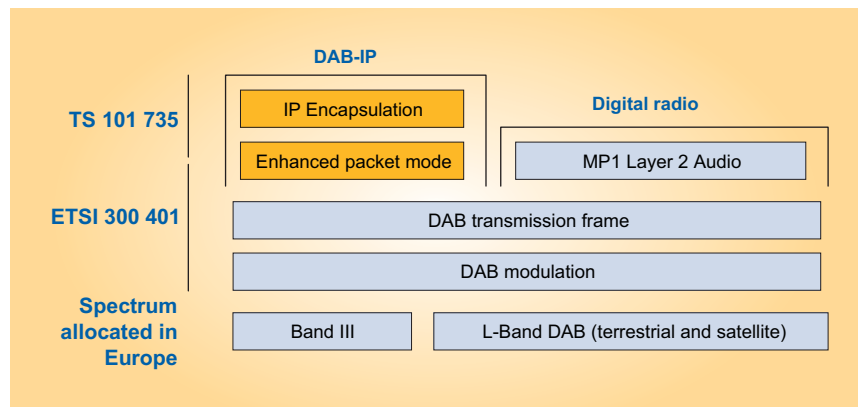


Figure 3
DAB-IP Architecture

TV source encoding and rights protection

Maximizing the use of scarce capacity is vital at this stage in the development of mobile TV, along with providing appropriate protection for the content being carried. The latter is required to safeguard revenues generated from the service and reassure content providers.

Forming a key part of the platform that sits on top of DAB-IP, BT Movio has selected **Microsoft Windows Media** technology for the video and audio codecs as well as its digital rights management

system (DRM). Specifically, Windows Media with DAB-IP provides a highly efficient conduit for delivering video and audio services over the DAB network.

EPG

The electronic programme guide (EPG) designed for BT Movio proved hugely popular. The EPG provides users with seven-day rolling programme data and it enabled users to move seamlessly within the large selection of TV and DAB digital radio services that were available.

The EPG used in the pilot was an innovative solution combining DAB signalling and broadcast EPG data using ETSI standards. This programming data can be received on all WorldDAB radios which support EPGs.

Enhanced DAB coverage for indoor use

The D1 multiplex covers more than 85% of the mainland UK population so BT Movio services were available within these coverage areas from day one. In addition, BT Movio also invested in enhancing coverage in the pilot area, in order to improve indoor reception. For launch, BT is building further “filler” transmitter sites in the few areas where indoor coverage is not currently available. For launch, BT will extend this coverage more widely providing indoor coverage for at least the major metropolitan centres.

Devices

BT Movio funded the development of a reference DAB-IP equipped mobile phone platform. This was an essential step in enabling a rapid rollout and provides a useful tool for broadening the pool of potential suppliers.

The prototype devices used for the pilot were modified versions of an existing smartphone model. This approach helped reduce the investment needed and potential delays that would have attended the use of an all-new design. Inevitably, however, the prototype had some performance limitations, which were picked up in the research results and have been rectified in the launch device.



Figure 4
The Trilogy – the world’s first DAB-IP enabled Smartphone developed jointly by BT, TTP and HTC

The launch device, shown in *Fig. 4*, is a fully functioning 2.5G mobile phone which includes an integrated DAB receiver, so users can enjoy broadcast digital TV and DAB digital radio services aided in their navigation by a broadcast EPG.

Appeal of the service

Users find the idea of having a TV and DAB digital radio service on their mobile appealing, although there are certain factors which are expected to influence how attractive they find the service in the long term. During the pilot itself, over half the users rated the appeal of the service at 4 or 5, on a

scale of 1 to 5 where 1 is not very appealing and 5 is very appealing (see Fig. 5).

The qualitative research conducted during the pilot aimed to capture the conceptual appeal of the service, and what factors would affect its long-term appeal. The quantitative research also sought to establish how to maximize the appeal of the service for launch and for the longer term, based on users' experiences during the pilot.

Conceptually, TV and DAB digital radio on a mobile is of interest to the majority of users, for six main reasons:

- It represents where mobile technology is heading – these services are seen as the logical next step after portable TVs and video-to-mobile;
- It is a visible technological progression, and much more tangible (and therefore more exciting) than, for example, advancements in microprocessors;
- It is an all-in-one device, enabling users to communicate and have access to information and entertainment on the move without carrying multiple devices;
- Users are able to stay connected wherever they are – keeping track of events and being informed immediately;
- These services provide readily available entertainment – useful when on a long journey or for moments of boredom;
- They help to perpetuate the “love affair” for those who are committed TV viewers.

In the long term, participants have high expectations of the service. Users expect to have a choice of channels, with the five terrestrial channels as the benchmark and ideally a further choice of channels beyond that. High service quality is also a key factor, along with reliable reception, clear sound and pictures without interruptions, and a robust battery in order that entertainment features do not compromise critical functionality (i.e. making a call). Finally, the service must be priced competitively, should offer a range of payment plans and should not become more expensive than the primary function of the phone – personal communication.

Universal appeal

TV-to-mobile had universal appeal across the subgroups in the sample, but it was especially pronounced in the 16-24 and 25-34 age groups and for mobile users with a higher monthly spend. Encouragingly, there was little drop in interest between the two waves, indicating that the high levels of interest cannot solely be put down to the initial “wow factor” but rather that the TV and DAB digital radio services had sustained appeal over the full period of the pilot.

During the second wave of telephone interviews, when asked about factors which would encourage them to use the TV service more often, the answers fell into three broad categories:

- 82% wanted technical performance improvements – including better reception, battery life, and a more reliable headset and handset;
- 55% wanted an improved content offering – such as the number and type of channels;
- 42% said they needed more viewing time – which is not something a service provider can address.

The vast majority of reasons for not using the service were addressable issues which were mainly related to the limitations of the pilot platform and handset. Only a small minority of users suggested that lack of interest was their key reason for not using the service.

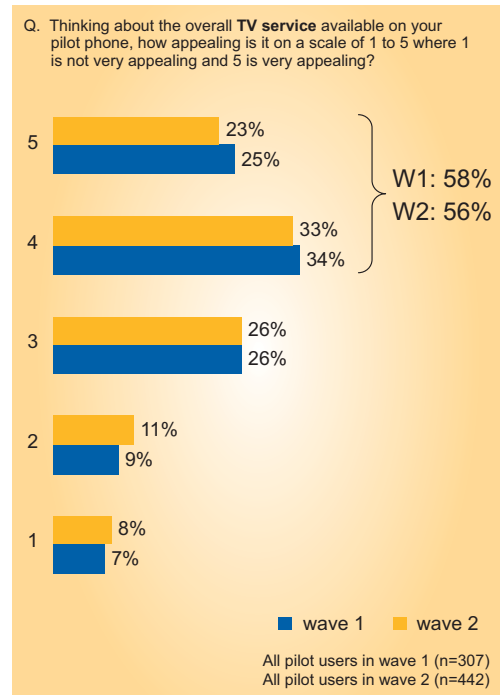


Figure 5
Appeal of the TV service

DAB digital radio – an important part of the mix

Users also valued the DAB digital radio service very highly, with DAB providing a much higher quality listening experience than is available on the FM-equipped mobile phones which have been on the market for some time. The icon-based user interface to select radio channels was very well received by all pilot users and regarded as a significant improvement over FM radio.

There was no difference in appeal across the age groups or existing monthly spend, but the appeal was significantly higher amongst women (71% of the women questioned rated the service as appealing or somewhat appealing, compared with 59% in the case of men).

Despite the novelty of the mobile TV service, the DAB digital radio service remained a popular element of the entertainment package offered. This was due to a number of reasons such as the wide range of stations offered and the simple fact that the medium of radio suits more occasions for use, since it is possible to carry out everyday activities and listen at the same time.

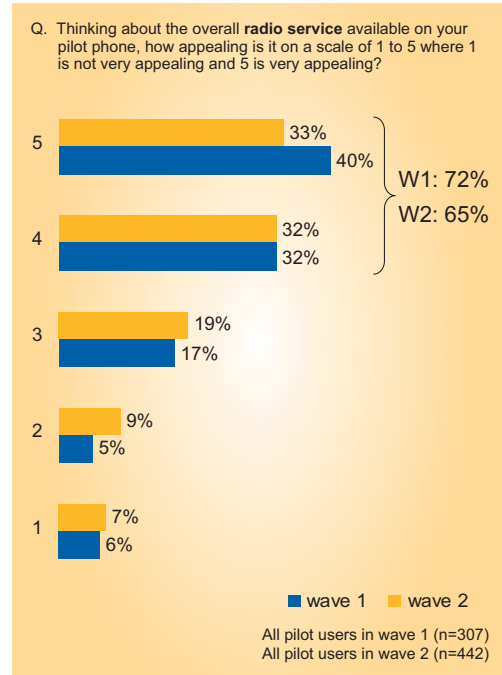


Figure 6
Appeal of the DAB digital radio service

Propensity to pay for mobile broadcast services

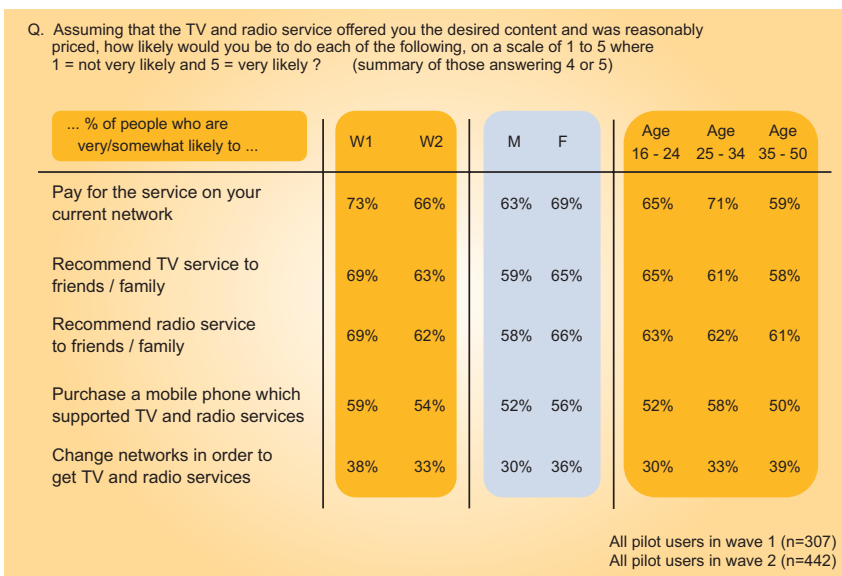


Figure 7
Likelihood of uptake

When asked about the likelihood of uptake, users' responses were encouraging (Fig. 7). In particular, over two-thirds of users would pay for the service on their current network, and around a third would change networks in order to be able to receive TV and DAB digital radio services.

Perhaps surprisingly, older users and females suggested they were even more likely to switch for this reason.

Whereas many pilots find there to be a large drop-off in interest between the start and end of the research period, we observed only a small drop in

this case, suggesting the enduring appeal of the service.

Uptake drivers

The pilot found that a key driver of TV-to-mobile service uptake is the relationship that users have with traditional television, rather than their willingness to adopt new technologies. Thus the appeal is much broader than just the classic early adopter who is usually attracted by new mobile technology.

Pilot usage for TV services

Firstly, it must be pointed out that, as with any pilot, there were some “artificial” factors. In this case, participants were encouraged to use the services as much as possible, although this was at least partially offset by the limitations placed on usage by some service issues, such as variable reception, and a small number of TV channels and genres of entertainment.

The results for length of viewing (Fig. 8) were extremely encouraging, with the average length of viewing session at 17.66 minutes and the average time spent using the TV service per week at 66 minutes in Wave 2. These figures were much higher than expected. The average number of times per week that respondents used the TV service in Wave 2 was nearly four.

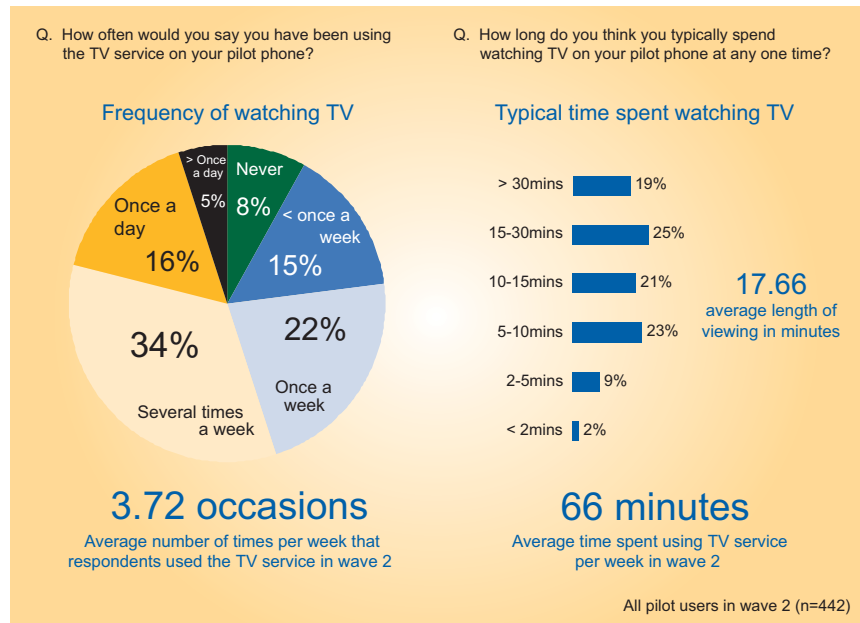


Figure 8
Length of time spent TV viewing per session

One of the most exciting results was the unexpectedly large proportion of usage at home (34%) which was nearly as high as for the more predictable commuter use (39%). Around a fifth of users consumed the service most often whilst at work or school/college, and the remainder was split between other locations such as pubs, bars, coffee shops, or whilst out and about generally.

The pilot found (Fig. 9) that 21% of users accessed the TV services before 9am (Wave 2 results). This usage included getting up and preparing to leave the house (which adds flexibility to morning entertainment with the capacity to switch between watching and listening) and during the morning commute, when it offers a more diverse source of entertainment and an alternative to papers and books.

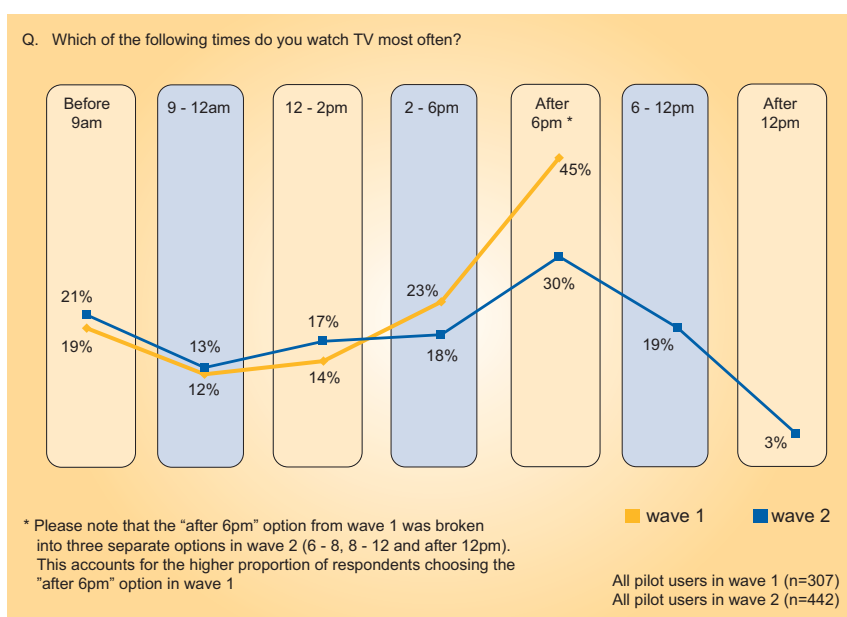


Figure 9
When users accessed TV

Daytime use was split between 9 - 12am (13% in Wave 2), 12 - 2pm (17% in Wave 2) and 2 - 6pm (18% in Wave 2). For students and homemakers, this gave an opportunity for viewing during breaks from classes or housework, or while minding children or when spending time with friends. For office workers, the service gave users a chance to have short bursts (10-20 minutes) of news or entertainment during breaks and lunchtimes.

Evening was the most popular time for using the service, with 52% viewing after 6pm in Wave 2 (particularly from 6 - 8pm, during the evening commute).

Outside the home, the service was used whilst waiting to pick up children, running errands (such as waiting in queues or traffic), travelling or as a source of entertainment whilst out and about (such as checking the football scores at the pub). At home, the device seemed to be used as a personal TV, often because the main TV was occupied by family/flatmates, as well as being used to relax before going to sleep.

Popularity of TV channels

During the initial phase of the pilot, three genres of content were offered including news, music and sports news. Responses from Wave 2 showed that of these, news had the broadest appeal across the demographic groups – the medium of live broadcast TV clearly lending itself favourably to this type of content. Sports news tended to appeal more to males who watched it heavily whilst the music offering was particularly appreciated by young females.

A wide variety of genres – including comedy, sitcoms, music, news, films and drama – scored highly in the quantitative analysis, although the qualitative research tempered this. For example, when asked to properly consider these categories, many respondents admitted there would be limited occasions (such as on a long train journey) when they would watch a film, and that the strong narratives involved in dramas might be difficult to follow on a mobile platform.

Participants also recognize the importance of advertising to channel revenue, but do not want to see it become too intrusive. As a benchmark, users feel that advertising levels on mobile TV services should be no more than is normal on traditional TV.

An additional piece of work was undertaken at the end of the main pilot to investigate the appeal of different genres and brands of content. The package offered during the two-week pilot extension had a heavy entertainment bias with more traditional episodic programming. This substantiated the earlier findings that users were happy to spend extended periods of continuous viewing of TV on a mobile device. This demonstrates that the content which can be offered on this platform does not need to be limited to “snack” programming and rolling news.

Pilot usage of DAB digital radio services

In a similar way to the trends we have seen with TV, the user's relationship with music influences the role that radio plays in their lives. Radio is often people's main source of music, giving them access to more variety than their own personal collection. Many users are therefore attracted to the expanded range and quality offered by DAB digital radio.

Overall, participants had a very positive response to DAB digital radio; they found it easy to access compared to FM radio, and appreciated the ease of navigation provided by the Electronic Programme Guide (EPG).

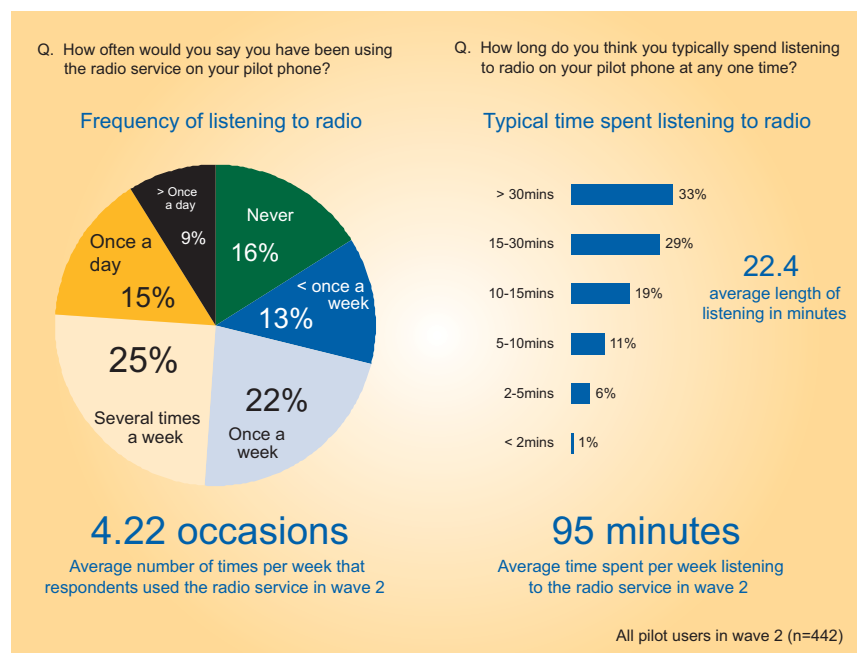


Figure 10
Average length of radio listening per week

The additional information that DAB digital radio provides also proved useful (such as what is playing, contact details for the current programme and so on).

DAB digital radio usage was high (*Fig. 10*). Nearly half of the participants listened to the radio at least once a week, while almost a quarter used it at least once a day. Users listened to the radio for 95 minutes per week on average, with one third listening for more than 30 minutes per session.

Locations for listening showed a similar pattern to those for TV viewing. However, 22% also used it whilst outdoors or walking about, and 6% listened to the radio whilst exercising at the gym, demonstrating the fact that radio is more compatible with certain activities. The daytime consumption pattern was also similar to that of TV.

Interactivity

One of the most powerful features of the service is the “red button” interactivity, which delivers a powerful new tool both for content providers and advertisers, and is now extended to DAB digital radio as well as TV. However, during the pilot this feature was limited to directing users to the station/channel website rather than providing programme-specific content adapted to mobile use.

The majority of users did not use the interactive facility during the pilot. This is potentially a reflection on the users’ relatively limited awareness of interactive services on mobile, and poor experience of interactivity on domestic TV. There was also uncertainty around charges which might be incurred for linking to the service via the mobile network.



Emma Lloyd is Managing Director for BT Wholesale's BT Movio venture, with executive responsibility for business development and delivering the BT Movio strategy. In 2001 she co-founded Livetime, a GWR-funded venture to exploit the potential of digital radio datacasting in the mobile data market. As Director of Strategy and Programme Management, she led the development of the strategy, business model and business plan to present to potential venture investors.

Ms Lloyd joined BT in 2004 as Chief Commercial Officer, when the Livetime venture was successfully transferred to BT Wholesale. She became Managing Director when BT Livetime changed to BT Movio in January 2006.

Ross Maclean was the Project Manager responsible for designing and delivering the BT Movio pilot which ran between June and December 2005. The pilot was the largest of its kind undertaken in Europe. He is currently looking at future product development for BT Movio, focusing on the expansion of interactive and value-added services across the platform.



After qualifying in Physics at Imperial College, London, **Andrew Stirling** started his professional life at the BBC, developing advanced content production and distribution technology. He then moved to a new venture where he played a key role in developing a radically new multimedia network technology which was adopted by a leading German car maker in the mid 90s.

Mr Stirling joined consultants Arthur D. Little in 1998, where he founded its global circle of device experts, focussing on support for innovation in new media platforms. Moving into the world of regulation at ITC, later Ofcom, he made key contributions to policy development in digital TV switchover, digital radio and spectrum management.

Andrew Stirling now runs his own niche consultancy, focussed on exploiting opportunities from convergence in communications, with a particular emphasis on multimedia wireless/mobile platforms. He is currently working on behalf of BT Movio to help define the network roadmap.

The pilot results suggest that users have an appetite for interacting but need to be motivated by attractive content – something that feels fresh and new and is rewarding – in order to be engaged with this new medium.

As an example, a competition was run on the music channel, offering users the chance to win an iPod in exchange for voting on their website. This highlighted the potential of red button interaction which can be unlocked if content providers make the benefits clear.

Paying for the service

We found that over two-thirds of the pilot users would be willing to pay on a monthly basis, as opposed to only a fifth who would prefer to pay on a daily basis. This was consistent across existing Pay As You Go (PAYG) and contract samples. There was also a preference for purchasing access to a bundle of channels, rather than to individual programmes or channels. We also found that around two-thirds of users were willing to pay up to £8 (€12) per month for the benefit of the service.

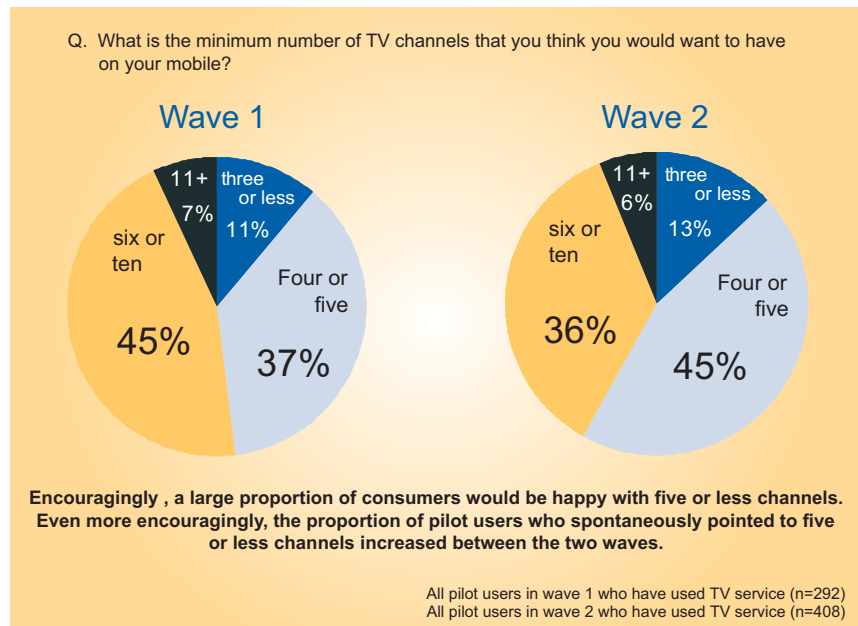


Figure 11
Minimum number of channels

Quality over quantity

Whereas at the start of the pilot, users expressed a wish to have a large choice of channels, experience of the service led them to conclude that they would be quite happy with around five channels (Fig. 11). It became apparent that it was more important to have a handful of quality channels rather than simple quantity.

There was also a strong preference for inherently live content rather than pre-recorded material.

Conclusion – a positive future for mobile TV

The results of this pilot are extremely encouraging for the future of mobile TV. We found that participants used the service extensively in a wider range of scenarios and locations than anticipated. In particular, we were surprised to see that users valued access to the service at home nearly as much as they did when on the move. On average, users spent nearly three hours per week consuming the service. The pilot users appreciated the complementary nature of the TV and DAB digital radio services, which provided them with a variety of content to suit a range of occasions.

Although participants initially expected the number of channels to be a prime factor in its appeal, they found through experience that they would be just as happy with a smaller number of quality TV channels rather than choice for choice's sake.

The DAB digital radio service proved immensely popular, due to the range of available stations as well as the consistent quality provided by the DAB digital platform. Given the broad selection of services on offer, the EPG proved to be a useful tool that encouraged users to experiment with new stations and channels.

The power of red button interaction was proved through the tremendous response to the iPod competition which was run during the pilot. We observed that users need more incentives and improved awareness of the benefits that mobile interactivity can bring.

The DAB-IP platform proved its service readiness and demonstrated the flexibility enabled by its foundation on Internet Protocol, which is fast becoming the interface of choice for service platforms.

This pilot demonstrates that consumers are more than ready for mobile TV and DAB digital radio, and that service providers can tap into the existing DAB capacity to begin to satisfy this thirst.

Acknowledgements

BT drew on the expertise of Basis Research to conduct the pilot study, and manage the collation of the findings as well as the recruitment of the pilot users. The research undertaken during the pilot used a mix of quantitative and qualitative methodologies and ran from June to December 2005.

Appendix: Pilot methodology

Broadly, users in the pilot fell into four categories ranging from “lukewarm viewers” to “TV junkies” (Fig. 12). This relationship with TV seems to influence how users are predisposed towards using a mobile TV service.

TV junkies tend to have or find the most occasions to view, and have a leaning towards mainstream content such as entertainment channels and shows (soaps, reality TV, lifestyle, music and so on). They have a preference for live TV, showing a desire to essentially

recreate their normal viewing experience, and as they are most interested in full-length programming they are most likely to watch for relatively long periods (20 minutes or more). This group has a varied demographic spread, covering all ages, genders and lifestyles.

Ad hoc avid users tend to have fewer occasions to watch TV and are more selective in their viewing habits, tending towards entertainment such as dramas, sport, upmarket lifestyle (such as property shows) and comedy sketches. Whilst this group has a preference for live TV, users also want content that they can pick up where they left off. They are interested in some full-length programming but also want the option of “snack-sized” content for the frequent occasions when they have more limited time. This group tends to be mid-20s and upwards, either male or female, and with children or busy social lives which lead to unpredictable schedules.

TV-friendly users have a more passive relationship with TV and will watch when there is an occasion to do so, but do not feel it is a priority. This group will watch almost any entertainment format, would like the option of live TV but could equally be entertained by archived programming and high-

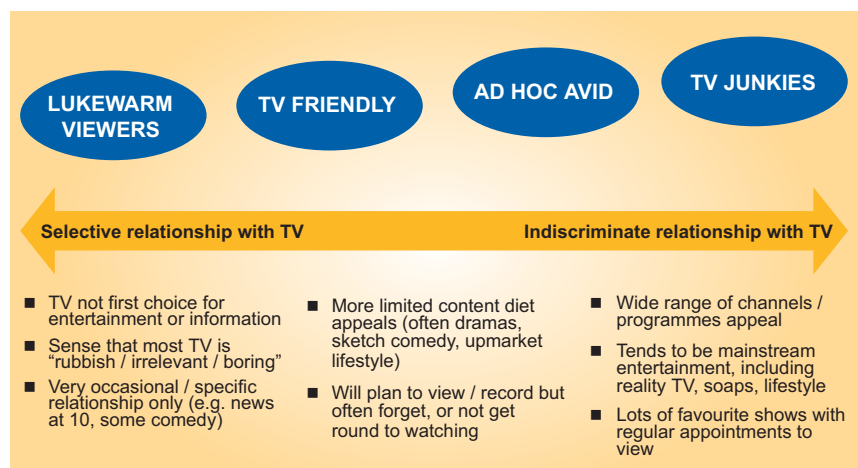


Figure 12
Classifying viewers' relationship with TV

lights, and are less likely to commit to full-length programmes. “TV-friendly” users tend to be older (40+), often with children, busy social lives, and hobbies and interests which take them out of the house.

Finally, *lukewarm* viewers have a limited engagement with TV and no real interest in deepening the relationship. Usage tends toward information (such as current events and specific news coverage such as business news) and entertainment options which are very specific to the individual. Live TV is important for news but for little else, and they are very unlikely to consume full-length programming. Typically, this group is likely to be older, time-poor professionals, often male.
