department for
culture, media
and sport

Traffic and Travel Services

Digital Radio Action Plan Report

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Section 1: Foreword

1.1 Introduction

The Technology and Equipment Group (TEG) has been tasked to identify, investigate, report and make recommendations on the technology and equipment issues related to any future Radio Switchover, including both domestic and in-vehicle receivers. The priorities for TEG include the usability of radio devices, the development of a set of common specifications and testing regime to provide quality assurance to consumers. Due to the importance of digital conversion of car radios, there is a specific In-vehicle sub-Group which looks at the barriers to take-up and conversion options.

The TEG is chaired by Laurence Harrison, Technology and Market Development Director at Digital Radio UK. Membership of the TEG includes representatives from government, the BBC, Ofcom, trade bodies, manufacturers and consumer groups.

1.2 Traffic and Travel Services Report

Under action 2.10 of the Digital Radio Action Plan, the TEG In-vehicle sub-group was tasked to report on the impact of any future radio switchover on providers of traffic and travel services, review the options for the continuation of FM services following a Digital Radio Switchover and the development of a DAB replacement for analogue traffic services.

The TEG In-vehicle sub-Group delivered the report on Traffic and Travel Services in Q2 2011. The report estimated that around five million cars had built-in navigation systems receiving traffic data via the Traffic Message Channel (TMC) service on FM radio. There could be another two million aftermarket units using the same system.

The report outlines three options, which are:

1. Maintain some broadcasting presence on FM

Some stations could continue to broadcast traffic data on FM radio, possibly involving a change in legislation to allow the BBC to carry TMC on its FM output.

2. Broadcast a TMC service on DAB

It is possible to broadcast TMC over DAB. Therefore, a translation unit that received TMC from DAB and rebroadcasted it via FM could be made to allow in-vehicle systems to continue to operate.

3. Use TPEG information broadcasts and convert to TMC in-car

It would be possible to continue to provide traffic data to existing TMC-enabled vehicles by having an in-vehicle adapter which took the TPEG service from DAB, translated it into TMC and rebroadcast it within the vehicle using a low power RDS/FM transmitter. For this option, a translation unit would need to be designed, built and paid for by users who had already paid for a TMC unit.

Section 2: Steering Board Decision

The Steering Board considered the Traffic and Travel Services report in July 2011. The Board noted that traffic and travel services were licensed services granted for a fixed period of time, so they had never been guaranteed of provision in the long term. However, the Government will consider the wider impact of switchover on traffic and travel services, in its impact assessments of the radio switchover policy.

Section 3: Traffic and Travel Services Report

Summary

Currently, around five million cars have built-in navigation systems receiving traffic data via the TMC service on FM radio. There may be another two million aftermarket units using the same system. The TMC system broadcasts a stream of inaudible data on FM. It should not be confused with spoken traffic announcements that cut into the radio, as it is a coded feed of traffic information. As the country moves towards digital radio switchover, Government needs to consider the effect on these navigation systems and their users if the FM radio they rely on is effectively switched off.

Were the majority of FM stations to broadcast only on DAB today, these millions of navigation units would stop receiving traffic information. The navigation system would still work but would no longer know of congestion, accidents, road works, or other traffic events. Drivers would be less well-informed, and, not knowing of traffic problems, would join, and compound, queues. The EU ITS Directive requires UK Government to ensure traffic information reaches drivers and TMC is used globally as the core of this.

By 2020, TMC should have been superseded by transmission of data via DAB using a format called TPEG. But even when TPEG is introduced, there will be millions of cars with the FM legacy system on board which will still require a traffic information service. It is highly likely that cars with navigation systems supported by FM-broadcast data will be on the roads well into the 2020s. In addition, because of the lead times for vehicle design, cars and commercial vehicles with TMC will still be on sale in 2015-2017, the period when radio broadcasts are expected to transition from FM to DAB.

The Digital Radio Action plan calls for this issue to be considered by the In-Vehicle Sub-Group, which delegated the task to a Traffic and Travel Services Working Group. The Working Group, which includes vehicle manufacturers

and the information providers, has concluded there are three options:

a) Maintain some broadcasting presence on FM

TMC services are currently broadcast alongside existing stations' output (either on Classic FM or a network of other commercial stations). Broadcasting TMC data only without other output is cost-prohibitive. One solution would be to allow some stations to continue on FM, possibly involving a change in legislation to allow the BBC to carry TMC on its FM output. While this goes against the Government's strategy of all but the smallest commercial and community stations broadcasting on DAB rather than FM, it does keep up to seven million navigation users connected.

b) Broadcast a TMC service on DAB

c) Use TPEG information broadcasts and convert to TMC in-car

Both are technically possible but no units are yet able to receive the information. (At present, even cars with DAB radios fitted on the production line receive their traffic information via FM). A translation unit that receives TMC off DAB and rebroadcasts it inside the car on FM would need to be designed and manufactured. The question is: who would be expected to pay for such a unit? This solution supports the Digital Radio Action Plan but will create extra costs for current TMC users. Although TPEG requires fewer changes to current broadcasts and encourages the take-up of TPEG data, a translation unit would need to be designed, built and paid for by users who have already paid for a TMC unit.

These options have been endorsed by the In-Vehicle Sub-Group.

Conclusion

Government and industry could promote a wholesale change of navigation from TMC to other DAB or internet services. Given the timescale for change, drivers may be less likely to complain to government if given warning. However, this still raises the issue of brand new cars being fitted with devices that in a very short time will no longer work.

Industry wants to be part of a joined-up policy on FM-to-DAB transition to ensure that drivers who have, and rely on, TMC units continue to receive quality traffic information once FM is no longer used for the majority of radio

broadcasts. None of the above options is ideal and industry seeks further guidance on the trade-offs between DAB radio and traffic congestion policy.

1 Introduction

This is the first of the reports required by the Digital Radio Action Plan (DRAP) on the impact which switch-off of national networks will have on providers of traffic and travel services.

It deals only with the impact on traffic and travel services using digitally encoded data continuously provided by RDS-TMC (Radio Data System – Traffic Message Channel) services. It does not consider the future delivery of spoken traffic announcements described as 'Traffic Announcement' (TA or EON-TA) on FM RDS radio.
The report is a statement of the present position and does not include any recommendations for future policy. This is consistent with the statement in the DRAP that the Plan's purpose is

'to provide the information to allow for a well-informed decision by Government on whether to proceed with a Digital Radio Switchover. Following a decision to proceed, this Action Plan would enable Government to decide when and how to deliver a Digital Radio Switchover and set the foundations for a successor project to implement it.'

For working purposes, it has been assumed that a digital radio switchover will occur sometime in 2015. Delaying switchover would reduce the size of the challenges described in this paper.

2 DRAP Terms Of Reference

The DRAP version 3 (the version current when this report was drafted), requires the Traffic and Travel Services group to

'Report on the impact of the analogue switch-off of national networks on providers of traffic and travel services, review the options for the continuation of FM services following a Digital Radio Switchover and ensure the development of a DAB replacement for analogue traffic services.'

The Action Plan required a first report to be published in the second quarter of 2011.

3 RDS-TMC

a) The technology

RDS-TMC services in the UK provide information about congestion (reduced road speeds because of volume of traffic), road works, and incidents (such as accidents, objects on the road, or hazardous driving conditions). RDS-TMC can also be used to send additional information, such as speed limits and security information.

Data is fed to the TMC receiver as a set of individual traffic messages, which contain information about the type of traffic problem and the location. This is encoded in accordance with an international standard. (RDS-TMC uses Alert-C coding as defined in ISO 14819 Parts 1 - 3 and 6, due to be updated by the end of 2012).

The messages are used within the navigation system display (or HMI) to show icons on a map or a list of problems on a planned route, providing safety information and warnings of potential delays. The information also provides estimated journey times. In some systems, the information is used to provide alternative routes avoiding known problems (‘Dynamic Route Guidance’).

It is important to distinguish between this digitally-encoded data and the spoken traffic reports provided as part of the FM radio programming.

RDS-TMC data is encoded into messages and sent cyclically over the FM RDS sub carrier using an RDS feature called an Open Data Application (ODA). An ODA allows innovative new features to be implemented and broadcast to suitably equipped receivers using the RDS standard.

As things stand, all RDS-TMC systems will cease to receive traffic and travel information when switchover occurs

b) Distribution

The current service uses national and regional FM networks as the distribution infrastructure. Full national coverage, extending to both urban and rural areas and to local roads as well as those of national significance, is essential to the provision of a high-quality service.

The digital radio switchover will move the majority of these radio networks from FM to DAB. This will make the present

RDS-TMC service unavailable to all existing users, including those using aftermarket devices as well as those whose vehicles are fitted with navigation systems.

There is an indication that some FM frequencies will continue to be utilised by 'ultralocal' radio stations. However, these are expected to provide only low power broadcasts in very localised areas. It will not be feasible to support an RDS-TMC service for automotive use via a patchwork of these stations.

4 RDS-TMC – The Market

a) Vehicles in use

Approximately 5.0m cars in the UK now have navigation systems which provide traffic information to provide warnings of traffic congestion, accidents and road closures, and other traffic events. These vehicles were fitted with systems on the production line ('OE systems').

The number will continue to grow between now and the time that a decision about switchover is made. If that decision is made in 2013 and the percentage of new vehicles fitted with OE systems remains constant, the number will rise to 5.5 - 6.0m.

In addition, it is estimated that another 2.0m aftermarket devices – 'Personal Navigation Devices', or 'PNDs' – are in use.

To the number of UK – registered vehicles fitted with OE systems or using PNDs in service on any one day must be added non-UK registered vehicles, especially commercial vehicles, temporarily operating here.

(Source for all figures: SMMT, based on information provided by service providers and SMMT forecasts of new car registrations for 2011- 2012.)

b) History of the market

Since 2001, there has been significant growth in the inclusion of TMC as a feature of navigation systems. It is now unusual to find a navigation system which does not include a traffic feature as standard.

Part of this growth was driven by the introduction of the PND market in the period 2005 – 2007. PNDs, with low prices, increased the overall exposure of motorists to navigation, and gained a large share of the market. In turn,

this caused vehicle manufacturers to reduce the cost of their OE systems, resulting in a large increase in the uptake of systems in new vehicles.

The availability of OE navigation systems has thus spread through vehicle manufacturers' ranges, now reaching, as an option, to 'entry level' cars. 'Navigation and traffic' is standard fit on many high to mid range cars. (As an example, one mid-range car manufacturer has seen the OE fit-rate of its navigation plus RDS-TMC traffic information system increase from12% to 85% since the fourth quarter of 2009.)

c) Connected services

In recent years, several manufacturers have developed 'Connected services', which utilise cellular connectivity to distribute traffic data to vehicles. They have done this partly because of the inconsistent approach to the rollout of DAB across Europe and partly because of the development of the European e-call/b-call systems.

The relatively large amount of data required over a vehicle's lifetime means this approach has the limitation of needing on-going fees for the transfer of data. These have to be supported by the OE manufacturer or by having end-users pay via a subscription mechanism. Broadcast traffic data does not incur cellular data transfer fees.

5 Service Providers

In the UK, two service providers – ITIS and Trafficmaster – transmit traffic data via FM RDS-TMC to licensed receivers. Both charge for the service, providing it in return for a single fee per vehicle license.

ITIS utilises the national Classic FM RDS carrier and has a special AS/1 license, while Trafficmaster uses regional broadcast networks.

The UK structure is markedly different from that elsewhere in Europe. Many European countries set up publicly-funded services which give free access to traffic information. This model has tended to change slightly in the recent past, with many, but not all, of these services moving towards a more commercial footing. The result has been an increase in service quality. Some other countries, such as France and Germany, have a 'mixed economy' of free and charged-for services.

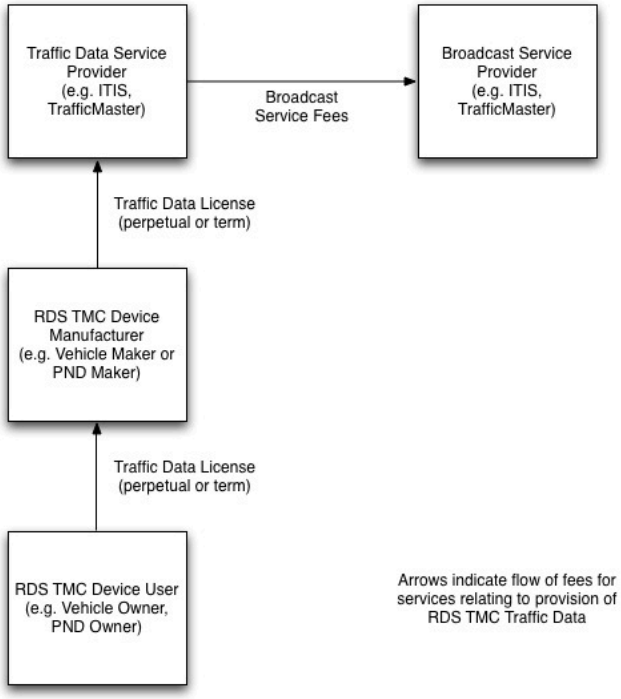
6 Service Providers' Business Model

OE access to one or other of the UK services is based on a single fee, paid by the vehicle manufacturer to the service provider when the vehicle is sold. The vehicle will continue to receive the service for as long as the service remains on air.

From the perspective of the user (driver), the service is free, because inclusion of the license fee in the cost of the new car means he/she does not pay a separate fee. When the car is sold, the service continues to be received by the new owner without any change or charge.

In the case of PNDs, virtually the same process applies. Most come with Term Traffic Data Licenses (though some are available with Perpetual Licenses). PND manufacturers enter into license agreements with service providers and a free ('bundled') license is included in the initial purchase price of the PND. At the end of the license, the user may elect to subscribe to further traffic data services, by contracting with service provider wither directly or via the PND manufacturer. These subsequent Term Licenses are typically delivered through a software license key entered into the PND.

The diagram below shows the data purchase chain:



Note: Broadcast Service Fees under analogue are charged on the basis of a 'Parasite' data service broadcast as part of an existing audio service.

7 The European Dimension

In July, 2010, the European Parliament approved a new legal framework for Intelligent Travel Services, with the aim of increasing safety for road users. In particular, the provision of traffic data is a high priority. Switching off the present generation of navigation systems would be incompatible with this aim.

Given that few countries have committed in the same way as the United Kingdom to complete digital radio switchover in the foreseeable future, it is understandable that, in some quarters, it is viewed as a UK-only issue. Indeed, because some European countries have only recently developed strategies for deploying DAB/DMB networks, there is not a coherent plan for DAB rollout across Europe as a whole. This makes it difficult for OE manufacturers and traffic service providers to plan an EU-wide approach to broadcast traffic information which would make broadcast TPEG services more attractive to vehicle manufacturers who design vehicles on a European (and, preferably, on a worldwide) basis.

There has, in fact, been one step backwards since the start of discussions about traffic and travel services. France had mandated the fitment of DAB on all vehicles sold there after 1 September, 2013. However, its government has recently announced proposed changes to its legislation which mean that DAB will not be required in vehicles until eighteen months after the date on which it is announced that digital radio reaches 20% of the population. This takes away one incentive for vehicle manufacturers to investigate the wider use of DAB if they were not already doing so.

8 Radio Switchover

a) Effects on vehicle manufacturers

Manufacturers of vehicles and navigation systems face several key business decisions as a result of digital radio switchover.

To recap:

- a minimum of two years' notice will be given of switchover date
- there will be a review in 2013 of progress towards meeting criteria based on listening patterns and digital radio coverage.

This leads to the assumption that, at the earliest, switchover will occur sometime during 2015.

However, vehicle manufacturers' lead times for new product development are typically 3 – 4 years. A car may stay in production for 8 – 10 years. It will generally have a service life of up to 12 years.

Thus, a two-year notice period is far too short for vehicle manufacturers to be able to develop new navigation systems. However, the uncertainty about switchover date makes vehicle manufacturers very reluctant to invest in developing new systems even if their investment plans allow them to do so.

In many cases, it may not be possible to upgrade all existing navigation systems to accept digitally-broadcast traffic information. It is expected that some existing infotainment (audio navigation systems) platforms and architectures currently in production vehicles will have to be used in new-build cars until 2017.

As a consequence, vehicles fitted with existing OE systems incorporating FM-based TMC traffic are expected to be in service until the mid to late 2020s. Although vehicle manufacturers will be able to mitigate warranty problems by careful wording of warranties and by publicity, they expect to lose good-will amongst those who bought new cars only to find that their navigation systems stopped providing traffic information shortly after purchase.

Government may wish to examine the feasibility of providing a legacy FM distribution system to support the existing traffic services post switchover.

b) Effects on service providers

Once a switchover date is announced, service providers will see diminishing returns from their RDS-TMC services. This will make it impossible for them to fund any legacy service which might continue post-switchover, although there would be a strong public interest on safety and environmental grounds for such a service to exist.

9 New Technology: Tpeg

Although FM RDS-TMC is a very successful technology with strong European and worldwide support, it is clear that alternatives are needed if vehicle features are to be

enhanced and vehicle manufacturers are to have greater opportunities for product differentiation.

Both the UK service providers have invested in developing a DAB alternative, called TPEG. UK DAB-TPEG services have been on air since 2009.

Series production of the first DAB-TPEG compatible vehicles, by a handful of vehicle manufacturers, will begin in late 2011 or early 2012. However, despite this, TPEG is still a relatively ~~a~~ new technology, in the early stages of deployment in the UK. Very few vehicle manufacturers are confident that they could support TPEG services in the UK by 2015. The majority view is that it will not be until 2017 that TPEG enabled navigation systems will be fitted by the majority of vehicle manufacturers. .

This means that the overall proportion of vehicles with access to traffic information via navigation systems after switchover will reduce significantly until the proportion of TPEG-enabled vehicles in the market begins to increase and approach the penetration levels of current equipment. This process will take several years.

On the technical side, TPEG needs a DAB tuner specifically for the traffic service.. The TPEG protocol is more complex than TMC and data is delivered at a rate 1,000 times faster. This presents serious challenges when it comes to modifying legacy navigation system platforms designed round the TMC standard.

10 The Future

The Traffic and Travel Services Working Group identified three possible scenarios, which the In-Vehicle Sub-Group has endorsed:

a) Continue to broadcast on FM

As mentioned earlier, there are two service providers in the UK who use the FM networks to provide traffic date using RDS-TMC.

These services could be continued post-switchover by keeping some FM on air. However, it is not technically possible for the two services to share an FM network, so two networks would be required.

Local radio stations are insufficient to support a national TMC service, because their coverage area is limited. Current national and regional broadcasts used by ITIS and

Trafficmaster allow coverage of cities – and also, importantly, of interurban and intercity routes. However, the proposal to retain FM spectrum only for ultralocal radio stations means that coverage of the road network overall would not be possible. To achieve acceptable coverage would require connectivity of a huge number of radio stations. The connectivity costs and infrastructure costs involved in running and maintaining a system based on such ultra-local radio stations would be prohibitive.

Because of the youth of the parc in 2015, it would be necessary to retain such networks for what is at present an indeterminate period. Given present assumptions about vehicle life and the period before suitable adapters become available, there is a strong view that a switchover during 2015 would require a legacy service to be continued until at least 2020.

Service providers have indicated that they would have major problems in funding a continuing network, because

- revenue from new FM RDS-TMC receiver licenses would be diminishing before switchover and be non-existent thereafter
- the cost of running and maintaining the infrastructure without contributions from commercial radio stations sharing the cost would be prohibitive

(Note:

Informal approaches have been made to Arqiva concerning the costs of providing a TMC-only service post-switchover.

Firm conclusions are difficult to reach at this stage, because

- Arqiva does not own the Classic FM transmitter network which ITIS will need, and so cannot guarantee to provide a fully operational network without either Global Radio's co-operation or the installation of new transmitters to replace those owned by Global Radio
- it is not clear that the BBC's national services would be switched-off at the same time
- the net cost of providing a service (continuing use of transmitters minus the cost of decommissioning them) cannot be quantified because the cost of decommissioning would depend on whether other services from the Classic FM sites remained on FM.

However, an indicative cost of £5.0m per year has emerged, based on

- use of Classic FM's frequencies

- replacement of at least some of Global Radio's transmitters because of their age
- BBC national FM networks remaining on air
- there being a five-year contract.

This could be doubled if the BBC's services were to be switched off, as the 'TMC' network would then need to bear the full cost of access to FM antennas.

The cost might be halved if Global Radio provided the transmitters free of charge at switchover and they remained serviceable for a further five years. The extended service life is, however, unlikely, given the age of the transmitters.

The cost might also be reduced by replacing the transmitters with lower powered units.)

b) TMC transported over DAB

It is possible to broadcast TMC over DAB.

Existing DAB receivers may be able to use this data by utilising a device similar to those used to provide DAB audio into FM radios by rebroadcasting the audio on FM via a low power transmitter. The broadcasting unit would also need to broadcast the RDS component of the FM signal to carry the TMC data. Existing navigation systems would be able to detect the TMC data from the mini-FM transmitter in the car as if it were a normal radio station. The RDS retransmission function could be an additional function of devices such as the Pure Highway.

To prevent local radio stations from interfering with transmitters, Ofcom could reserve a set of FM frequencies, and so remove the need for users to change to a clear frequency in different parts of the UK.

A TMC service on DAB would also potentially support a part migration of traffic data to digital. Some vehicle manufacturers will find it difficult to support the new generation of TPEG protocols, which are defined specifically for digital bearers.

Developing an OE-fitted TMC-over-DAB receiver would enable some vehicle manufacturers to avoid a loss of traffic data features in cars to be built during the period approaching switchover, because it would entail less development effort than developing a fully TPEG-enabled receiver. However, some vehicle manufacturers have platforms which could **not** be modified in this way.

It is feasible that TMC-over-DAB functions could be incorporated into 'premium' adapters designed for retro-fitting DAB audio to analogue vehicles or developed as stand-alone adapters, possibly for use by vehicle manufacturers wishing to retain the TMC capability of in-life vehicles.

c) Translation of TPEG TEC data to TMC

DAB is capable of transporting the TMC traffic messages currently transported over FM RDS. It is also capable of providing more detailed traffic messages using the TPEG format. (TPEG and TMC are not mutually exclusive over DAB.)

It would be possible to continue to provide traffic data to existing TMC-enabled vehicles by having an in-vehicle adapter which took the TPEG service from DAB, translated it into TMC and rebroadcast it within the vehicle using a low power RDS/FM transmitter.

However, the difficulty is the complexity of the data within TPEG. Such a receiver would have to implement a full TPEG decode and the translation task, which would be very challenging.

11 Timelines

2012	2013	2014	2015	2016	2017
First DAB -TPEG cars appear.	Switchover date announced		Switchover occurs		TPEG-compatible cars appear in quantity.

←----------→
Some present navigations systems remain fitted as OE

<----------→ 2020s

Cars fitted with present navigation systems remain in use