



BACKGROUND

The specification for digital terrestrial TV used in Europe was prepared by the DVB Project. It is known as the DVB-T specification (T for terrestrial).

To meet the different needs foreseen by the many European countries the DVB-T specification has many sets of closely related modes with different levels of ruggedness and different bitrates. The close relationship between the different modes means that it is easy to make one receiver that can receive all the modes of the specification without much added complexity. Any of the receiver chips on the market can be programmed to receive a wide range of different modes of the DVB-T specification.

Broadcasters can choose to trade ruggedness against bitrate. The more rugged, lower bitrate modes will be suitable for widespread portable reception, whereas the less rugged, higher bitrate modes will be suitable for transmission of a multiplex of many programmes (as currently used in the UK), or even HDTV, to receivers using rooftop aerials.

When the DVB-T specification was being prepared in 1995, mobile applications were not seen as very important. But since then in Germany, where there is already a high penetration of cable and satellite reception, mobile TV has been identified as a Unique Selling Point for DVB-T. Work by Deutsche Telekom reported in the BBC-led VALIDATE project has shown that mobile applications of DVB-T are feasible using the more rugged modes of the specification. BBC R&D is part of a new project called MOTIVATE to investigate mobile applications of DVB-T.



PROJECT WEBSITES

VALIDATE:

<http://www.bbc.co.uk/projects/validate/>

MOTIVATE:

<http://b5www.berkom.de/MOTIVATE/>

digital television

- on the move

The standard for digital terrestrial television in Europe (DVB-T) can be used for some mobile applications. In this demonstration you will experience digital television in a moving vehicle. We are also showing how DVB-T could be used in a mobile contribution link for programme making.



Research & Development

DVB-T for contribution

DVB-T can be used to transmit a signal from a vehicle used as a mobile TV studio back to the nearest transmission mast and thence back to the programme studio. This service could be implemented now, subject to availability of spectrum in any particular area of the country.



THE DEMONSTRATION

The vehicle contains a camera, MPEG coder, DVB-T modulator using the most rugged mode of the specification, and a 10 W transmitter operating on UHF Channel 48, a channel not used by any of the transmitters in the area. The signal from the transmitter is received by an aerial on the Reigate transmitter mast, then up-converted and sent back to Kingswood Warren over an SHF link of the type used for analogue outside broadcasts. The received signal can be seen on the monitor in CR1.

HOW THIS COULD BE USED

A vehicle equipped with an interview position, camera, and DVB-T equipment as seen in this demonstration could be used as a mobile TV studio.

With the vehicle stationary and a directional transmitting aerial on a pneumatic mast it would function in a similar way to the existing Radio Car. It could also be used as a base station for one or more of the digital radio cameras now being developed. In this configuration a DVB-T mode with a high enough bitrate to allow post-processing (say about 9 Mbit/s) could be used.

With the mast down and the vehicle in motion, a more rugged lower bitrate mode of the DVB-T specification could be used to give sufficient quality for news inserts – for instance to interview a busy politician on the way to the airport.

Although the mode of the DVB-T specification currently used for broadcasting in the UK is not suitable for mobile reception, if more spectrum becomes available in future – for example through the migration from analogue to digital services – then mobile reception of digital TV and data services is a real possibility. This possibility needs to be evaluated now, as part of the debate on the future use of the UHF spectrum.



mobile reception of DVB-T

THE DEMONSTRATION

The pictures originate at Kingswood Warren and are modulated using a rugged mode of the DVB-T specification. The modulated signal is sent to Reigate transmitter mast over an SHF link of the type used for analogue outside broadcasts. It is broadcast from Reigate using UHF Channel 27, one of the channels allocated to digital services from Reigate which are due to start in June 1999. The signal is received in the vehicle with an omnidirectional aerial and demodulated using a receiver with the same circuitry as a domestic set-top box.

HOW THIS COULD BE USED

The only DVB-T mode mandated by the ITC for use in the UK is not rugged enough for mobile reception. However, if more UHF spectrum becomes available – for instance through the migration from analogue to digital services – broadcasting to mobile TV receivers is a real possibility. TV could be received in buses, coaches, and trains, and in the rear seats of cars. An audio description service could make the broadcasts accessible even to car drivers.

However, the more rugged DVB-T mode needed for mobile reception has only about half the bitrate of the mode currently used for digital TV broadcasting. Mobile reception is much more difficult because of rapid changes in signal strength and moving echoes. And the receiving aerials are much lower – typically 2 m above ground compared with 10 m for rooftop reception. So higher transmitter powers – or more transmitters – would be needed. A network planned for mobile reception should also give totally reliable portable reception.

