

# Satellite Services to Handhelds

Mobile TV over advanced Hybrid Satellite/Terrestrial Networks



## What is DVB-SH?

DVB-SH is the name of a transmission system standard designed to deliver video, audio and data services to vehicles and handheld devices. The key feature of DVB-SH is that it's a hybrid satellite/terrestrial system that allows the use of a satellite to achieve coverage of large regions or even a whole country. In areas where direct reception of the satellite signal is not possible, a terrestrial gap filler can be used seamlessly to provide coverage. It is designed to use frequencies below 3GHz, typically around 2.2GHz. The system and waveform specifications have been published as ETSI standards (TS 102 584, TS 102 585 and EN 302 583).

## Background

Mobile TV is expected by many to become one of the next big mass media markets. There has been significant activity in this regard since the publication in November 2004 of the DVB-H standard, now the basis of a growing number of mobile TV services around the world. DVB-H is primarily targeted for use in the UHF bands, currently occupied in most countries by analogue and digital terrestrial television services. DVB-SH was designed to exploit opportunities in the higher frequency S-band, where there is less congestion than in UHF. DVB began work on the DVB-SH specifications in 2006.

## How does it work?

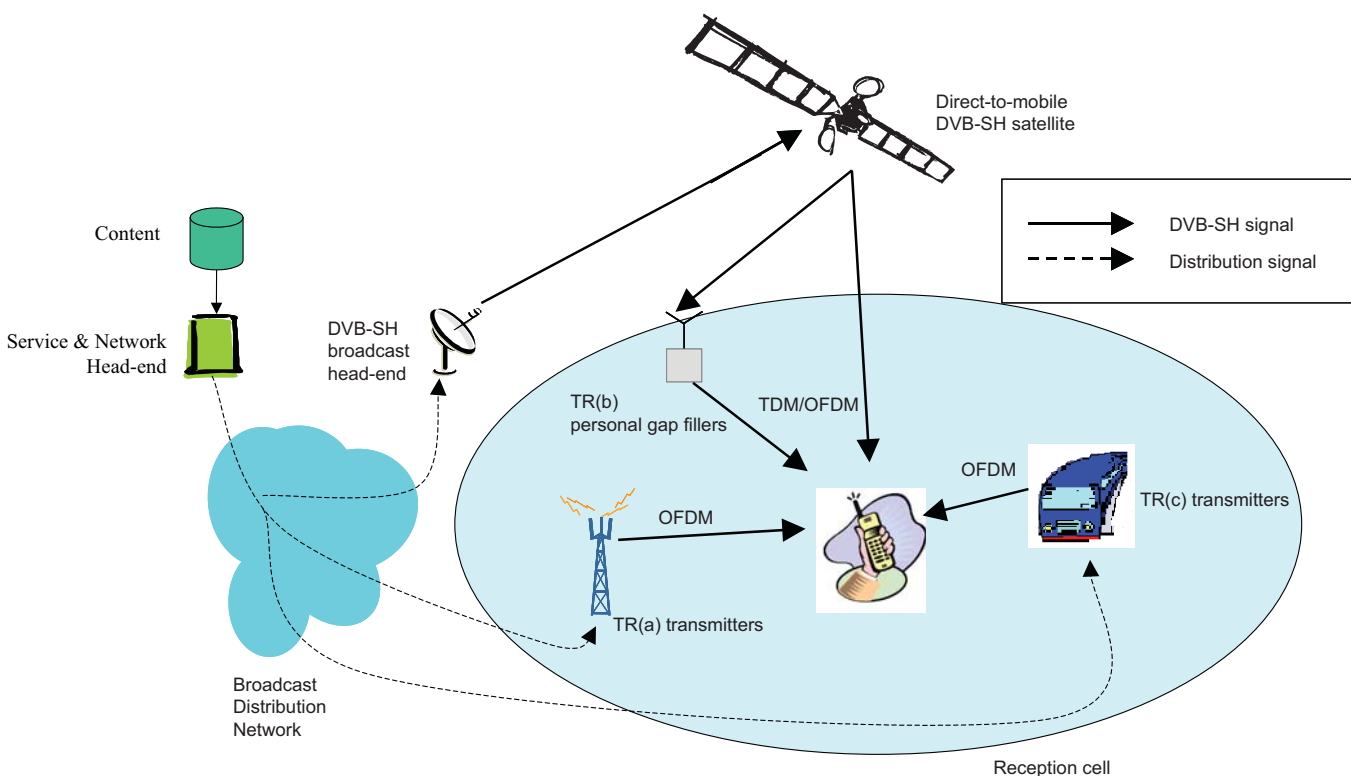


Figure 1. DVB-SH Network Architecture

OFDM (Orthogonal Frequency Division Multiplexing) is the natural choice for terrestrial modulation and is the basis of both the DVB-H and DVB-T systems. DVB-SH introduces a second scheme, a Time Division Multiplex (TDM), leading to two reference architectures termed SH-A and SH-B:

- SH-A uses OFDM both on the satellite and the terrestrial link
- SH-B uses TDM on the satellite link and OFDM for the terrestrial link

The S-Band is very demanding in terms of signal coverage. Its short wavelength (approx. 13 cm) requires a quite dense terrestrial repeater network in towns and cities. Naturally the cost of this network can be reduced if the signal-to-noise-ratio (SNR) required for stable reception is low. When operating in S-band, the burden placed on DVB-SH by the high frequency is compensated for by a selection of tools that enhance the signal robustness. For example a state-of-the-art forward error correction (FEC) scheme, 3GPP2 TurboCode, is used. In addition, DVB-SH uses a highly flexible channel interleaver that offers time diversity from about one hundred milliseconds to several seconds depending on the targeted service level and corresponding capabilities (essentially memory size) of terminal class.

DVB-SH does not define transport protocols, an Electronic Service Guide (ESG) etc. As in all other DVB transmission systems such "higher layer" issues are defined elsewhere. The DVB-IPDC specifications were originally defined with the DVB-H transmission system in mind and work is now continuing to ensure that they can also act as the "higher layer" of DVB-SH.

The combination of a satellite footprint and a terrestrial complement delivers nationwide coverage to terminals which implement the TDM and OFDM modes of SH, a combination of SH and DVB-H, or simply the OFDM mode of DVB-SH operating in SFN. Key to deployment will be DVB-SH's interface with the existing DVB-IPDC layer and the services based on it.

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## Market Deployment

April 2008 saw the launch in the USA of a dedicated geostationary satellite dedicated to the deployment of a nationwide DVB-SH network providing video services, navigation information and emergency messaging. Alpha trials of this service are on-going.

In Europe, the first DVB-SH technical pilots have been successfully completed. The European Commission confirmed in December 2006 that a slice of S-Band spectrum can be used for mobile satellite services and that complementary ground components of a hybrid satellite/terrestrial system are also permitted. A satellite targeting six large European markets was launched in April 2009, part of a joint venture between two large satellite operators. Commercial services are targeted for the end of 2009.

The regulatory authorities in France are considering the provision of mobile TV services using a combination of DVB-H and DVB-SH, with the use of DVB-SH in UHF one of the possible outcomes.

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## Next Steps for DVB-SH

The DVB-SH system and waveform specifications and the DVB-SH Implementation Guidelines have been published as formal ETSI standards. Work is continuing within the DVB Project's Technical Module on items such as performance validation through laboratory and field tests and the validation of the interfaces with DVB-IPDC.

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## Links

- [www.dvb-h.org](http://www.dvb-h.org) – mobile TV website of the DVB Project; information about service launches; technical documentation
- [www.dvb.org](http://www.dvb.org) – the main website of the DVB Project
- [www.etsi.org](http://www.etsi.org) – all DVB standards are available for download directly from the ETSI website