Wireless Microphones
in the Era of Digital Terrestrial Television

Digital Terrestrial Television (DTTV), also called DVB-T (Digital Video Broadcast – Terrestrial) in Europe and DTV (Digital Television) in the United States, is a milestone in the history of television broadcast. It requires a completely new broadcast infrastructure, with changes not only affecting TV stations but also the user, who may need an additional box for receiving TV programs. Where analog TV accommodated one TV program per channel, digital technology now transmits four different programs simultaneously in one TV channel due to sophisticated coding algorithms. Just as analog TV, DTTV transmits in the UHF range which will significantly affect the use of wireless microphones and wireless monitoring systems.

1. DTTV is a more spectrum-efficient way to broadcast programs and will save TV channels in the long run. However, numerous new services, which are not related to broadcast, hope to secure spectrum for themselves. In some cases, TV channels are made available for these new services, for example by auctions. Therefore, they are no longer available for wireless audio systems.
2. RF wireless systems cannot use other frequency bands. Moving to public frequencies (ISM bands) is not an option for professional applications, as these bands are congested with all kinds of wireless applications. Furthermore, the propagation of radio waves becomes more difficult the higher the frequency is. From the laws of physics, the UHF range is almost ideal for the transmission of analog wireless audio signals.
3. Due to their frequency agility, the ease of changing frequency windows and their unsurpassed multichannel capability, Sennheiser wireless systems provide the optimum performance in the era of DTTV.

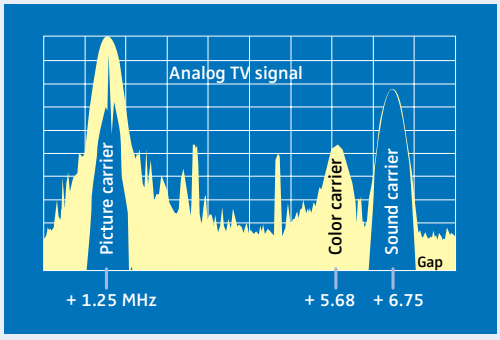
The changeover from analog to digital is going to be different from country to country and even from region to region. In most cases it will be a "soft" transition, with analog and digital transmission running in parallel on different channels (simulcast) for a limited time. Although DTTV is still not available in most countries, frequency planning is being done today, well in advance. The regulatory situation in the VHF and UHF bands has seen no major changes for decades, but new frequency plans will be drawn up soon.

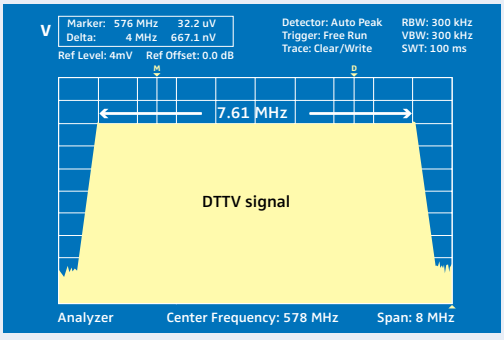
How will DTTV change the environment for wireless audio systems?

1. In Europe and Africa, the 1 MHz gap used for high-power reporting systems will disappear completely, as a digital TV channel occupies the entire 8 MHz window (see illustration).
2. The introduction of DTTV may require a frequency change of existing wireless audio systems because digital programs are usually on different channels than the analog ones. For the so-called "Region 1" (Europe, Africa and the northern part of Asia) a new frequency plan will be soon determined. The conferences commence in May 2004 in Geneva, Switzerland.
3. These conferences will also discuss the allocation of UHF spectrum to non-broadcast services. This spectrum would be lost for wireless audio, therefore it is important to support the broadcasters in keeping as much of the UHF range as possible. Note that every broadcaster uses the UHF spectrum twice: for broadcasting programs into the households, and for wireless microphone and monitoring systems during production.

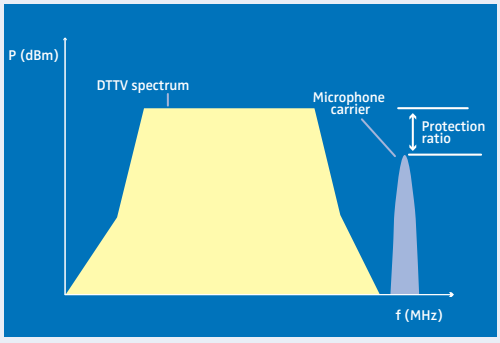
What do you need to observe when using RF wireless systems in a DTTV environment?

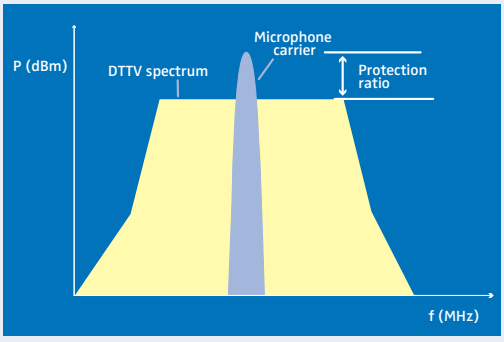
1. The more flexible, the more future-proof a wireless system will be. Sennheiser RF wireless systems offer excellent frequency agility. Switching bandwidths of 24 to 36 MHz permit an easy frequency change on location. Furthermore, the systems of the 3000 and 5000 Series have an internal macro-range of 100 to 200 MHz, within which the Sennheiser service departments can adjust new frequency windows if required. Systems which are less flexible or have fixed frequencies will find it hard to survive in the era of DTTV.





PAL analog TV signal compared to PAL DTTV signal





Signal levels and safety margins of a microphone signal/DTTV signal

2. The detection of occupied digital TV channels requires new tests and different equipment, as a DTTV signal has an entirely different structure and spectrum than an analog signal. There is a high risk of working in a digital channel without noticing it, as the audio signal received by an analog microphone receiver will be almost identical to white noise. Therefore noise is no longer evidence of a free channel. Spectrum analyzers will only indicate precise figures if adjusted to a very wide resolution bandwidth. The most efficient way of detecting a DTTV signal is the use of a standard DTTV box, ideally one with a USB port to connect it to a PC. The boxes are already available on the market.

Wireless audio systems can be used as before, however, they must not interfere with the reception of broadcast signals (as before). As a rule of thumb: wireless audio systems must not be operated within a DTTV channel if a DTTV program can be received. The regulatory bodies have not yet determined official levels and thresholds. For reliable operation, RF wireless receivers need a transmitter signal which is stronger than the DTTV signal (see illustration). Precise figures are still under evaluation, but our experience and tests – for example during the recent skiing world championships in St. Moritz, Switzerland – have shown that the use of Sennheiser wireless systems is possible even within a DTTV channel once the rules are obeyed and the reception of digital TV is not disturbed. The proper choice and positioning of antennas helps a lot. The use of Sennheiser systems in adjacent channels is easily possible due to the high quality of input filters.

Sennheiser is well prepared for the era of digital terrestrial TV. Due to the performance and flexibility of Sennheiser wireless systems, a high level of audio production quality will be maintained even in the presence of digital TV transmitters. In case you have any questions or remarks about this topic, please contact the experts from your local Sennheiser Service Team. They will be happy to assist you.