Multimedia on TV and the Future for Mobile Usage

By Albrecht Ziemer

Traditional television provided via terrestrial antenna is in a state of disuse, designated as antiquated by many people who are unaware that this reception was the only means of receiving TV for decades, until the advent of cable and satellite. Only 8% of the viewers in Germany have been able to resist the definite added value provided by these alternative forms of reception.

The change in recent years mainly concerns the public broadcasters who are bound by German law to deliver programs to the whole population. As a consequence of the loss of audience share, the cost per viewer of terrestrial program delivery services has increased exorbitantly. However, instead of ending terrestrial transmission, the German government decided to digitize current analog transmissions in order to offer a new system. The new system would afford an opportunity to utilize the benefits of digital transmission and incorporate the experiences of foreign markets into a plan for the successful introduction of digital terrestrial television (DTT).

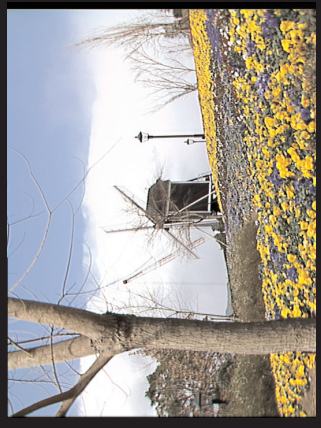
In spite of diminished euphoria in other countries, Germany has concentrated on the clear advantages of DTT, including its ability to support mobile reception and data services. As a consequence, the introduction of DTT has great potential for successful placement in the market. German Television Zweites Deutsches Fernsehen (ZDF), the largest TV broadcaster in Europe, aware of its special responsibility has been involved in the project from the very beginning.

A contribution received in December 2002.

In 1997, in order to support the digitalization of broadcasting and prepare its successful introduction, Germany, in cooperation with public and commercial broadcasters and the consumer industry, founded a nationwide organization—the Digital Broadcasting Initiative. The decision to switch from analog to digital terrestrial television by 2010 at the latest was made by the German federal government based on a recommendation of this initiative. This consensus was necessary to adjust national media laws, especially the "Rundfunkstaatsvertrag." The modification was a precondition for the switch of the transmission of public broadcasting from analog to digital services and the technical plans described below. The results of the initiative were published in several reports and are the basis for the plans in each federal state.

Summarized in a simplified form, the initiative concept views each broadcast area of coverage as an island and intends to migrate island by island from analog to DTT. DTT, based on COFDM technology, provides for single-frequency networks (SFN) and portable reception. SFNs have been recommended for the efficient use of frequency spectrum. It has been decided that indoor and outdoor reception is an essential precondition for a successful launch in the market. In conjunction with that, several practical tests have verified that the performance of mobile reception correlates with the quality of portable indoor reception, meaning that the decision to focus on portable indoor reception will, at the same time, generally guarantee mobile reception.

The DTT era in Germany began with the conversion from analog to digital services of two terrestrial frequencies in Berlin. Eight programs are now offered with the intent of achieving a complete switchover in the Berlin area by mid-2003, resulting in more than 24 free-to-air programs. In addition, initiatives adopted for each federal state provide for conversion following the prescribed



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guidelines of the Digital Broadcasting Initiative. The goal is the gradual changeover in the other regions and nationwide broadcasting of at least 12 and more than 24 programs in the future. In order to benefit from the experiences in Berlin, as well as the results of a market study that accompanies the whole process of migration in this area, additional regions won't be included before 2004.

DTT—Advantages and Aims

Except in large urban areas with a high number of commercial programming service providers, current analog transmission offers the German public at least three programs via roof antenna: one from the ZDF and two from ARD.

A Stable System

Opposite to the current analog PAL television, digital terrestrial television presents an extremely stable system. DTT will optimize reception so that on-screen experiences with ghost images caused by reflections will vanish.

SFN

The greatest disadvantage of analog television technology is the wasteful use of frequency spectrum; one channel is assigned for exactly one program, and in order to avoid interference among adjoining transmitters, it is essential to assign different frequencies and avoid assigning adjacent channels in one area. A significant advantage of DTT is economy of frequency, achieved by using several neighboring transmitters to build up an SFN. All transmitters inside the network will work with the same frequency.

Signal Transmission

Using modern compression techniques and a completely new means of modulation, DTT offers the transfer of digital data packets without differentiating between content and utilization. The signal is transmitted using the MPEG-2 standard. The digital transport stream consists of equal size data packages, where each package can contain different kinds of information: TV signals, audio signals, even still pictures or other data signals. Using the current technology, a single existing analog channel can transmit up to four television programs or other information and news services. The processing and presentation of data or TV signals are carried out in the receiving end.

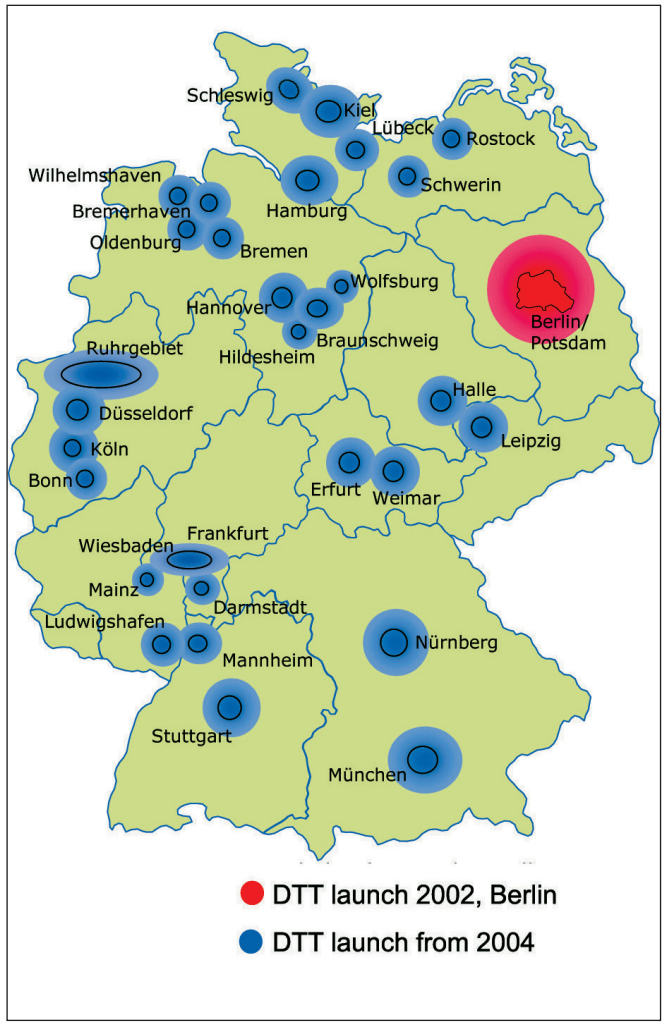


Figure 1. Start-up regions for DTT in Germany.

This channel multiplication and the ability to get more than "only" TV represents a benefit for the consumer who will experience television and services in a new modified form. Starting in Berlin, our practical implementation will serve to prove if DTT will be suitable for the market and accepted by the consumer, while assisting broadcasters in selecting the optimal choices in technology, programming, and equipment necessary to ensure success.

Portable Indoor Reception

Compared to all other methods of broadcasting, DTT offers a unique feature: portable-indoor reception. Users who were dependent on the installation and alignment of a roof aerial may now receive digital-quality terrestrial programs and other services and information via a pencil-sized antenna in closed rooms, without aerial

sockets or expensive installation, but with a little set-top box for converting the signal.

Changeover to DTT

The introduction of digital television in the cable and satellite market in Germany is more or less complete. However, the switchover to digital distribution certainly is not: merely 3 million households take advantage of digital quality. Economic aspects, as well as scarce frequency resources, rule out expanded digital and analog terrestrial transmission, therefore, the changeover must be done while analog transmission is still in operation. Simulcasting will be required to protect the public interest and guarantee that the customer can find suitable services.

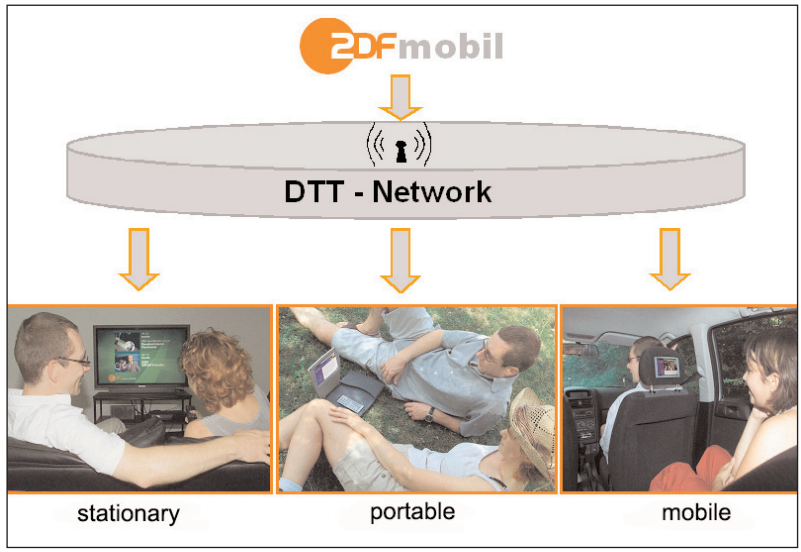


Figure 2. ZDF-mobil on various devices.

The current frequency spectrum allocation originated from the apportionment decided during the Frequency Conference in Stockholm in 1961 and will be reviewed at the next one (the Stockholm Follow-up Conference) in 2005 and 2006. Therefore, the most important challenge for the Digital Broadcasting Initiative at this time is national and international frequency coordination. This is necessary in order to enable each country's successful DTT network development within its own broadcasting targets.

Depending on the results of this conference, Germany expects to reach up to 24 or more programs nationwide. However, the working groups decided to begin digitalization of the current analog transmission as soon as possible. The results of the frequency conference will then be used to optimize existing DTT networks. Preparations for the changeover have been made, as mentioned above, in the consumer industry as well as among private and public broadcasters, taking politics and the economy into account.

Summarized in a simplified form, the plan calls for migration on an island-by-island basis from analog to digital terrestrial television employing a staggered time schedule. The islands are defined as independent regions that include an area of high-density population, as shown in Fig. 1. According to the detailed preparations, the separated areas will come together gradually, taking into account the frequency coordination and logistics required by the industry. Additionally, the experiences of the initial islands to be changed over may be used in the subsequent areas.

The first region in Germany, which has already started digital terrestrial distribution in a preliminary phase is Berlin, and the next steps in this area will follow until analog distribution ends in autumn of 2003.

DTT Launch in Berlin

The leading German broadcasters signed a Memorandum of Understanding at the beginning of 2002, that provides for the transition from an analog to a digital transmission system. The agreement planned to carry out the conversion in three steps. The first step was completed on November 1, 2002, digitizing two powerful frequencies and distributing eight programs. All other frequencies remain analog for the moment, which benefits the analog terrestrial viewer who is able to test the new reception before analog distribution ends completely.

The second step will occur in March 2003 with the switchover of all primary broadcasting services and the distribution of at least 24 programs over DTT. German Television ZDF will digitize one of its most important transmitters and introduce the new package, "ZDF-mobil." In order to guarantee a gentle changeover, the public broadcasters—ARD and ZDF—will continue analog program distribution until August 2003, when these channels will be switched off (the third step). This will end analog terrestrial distribution of TV in Berlin, which was started in 1935 with the first regular TV broadcasting service.

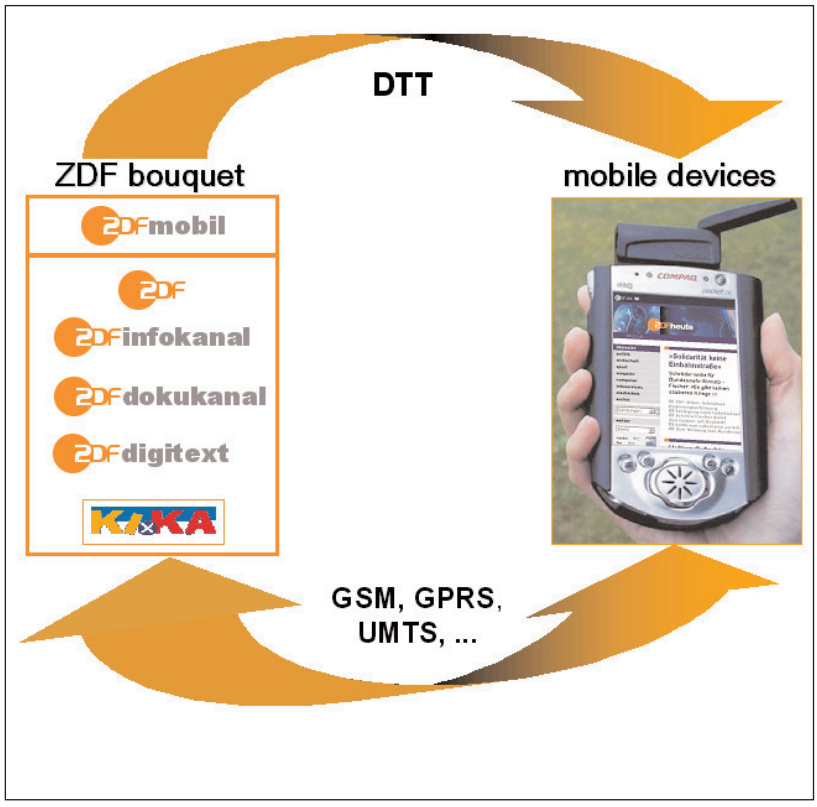


Figure 3. ZDF-mobil data services.

German Television ZDF-mobil

Based on the decisions of the Digital Broadcasting Initiative, several tests have verified the technical performance of portable indoor and mobile reception. With these unique features, DTT offers the solution for a modern and revolutionary new form of using television, corresponding with the modern age of information and communication and taking into account the desire for mobility and portability. This is reflected in the current development of mobile devices especially in the telecommunication market and will occur, without doubt, in the TV market. German Television ZDF has been aware of the potential of DTT in the mobile field and demonstrated a complete concept for wireless interactive and mobile usage at the International Radio and Television Exhibition IFA 1999. ZDF-mobil, introduced at the IFA 2001, is currently distributed in Berlin on pilot channels and is expected to reach the general public (up to 5 million people) in March 2003.

The ZDF-mobil multiplex contains four television programs: the ZDF mainprogramm; ZDF-infokanal, an information and service program with the whole range of TV activities; ZDF-dokukanal, with reports, documentaries; and a program for children, the Kinderkanal. In addition, the multiplex provides one data service, ZDF-digitext.

With its DTT package, German Television ZDF offers a complete schedule of information, education, and entertainment, with the information and documentation programs structured for short usage. The menu of the ZDF-mobil multiplex is aimed at the recipient at home, watching TV on his stationary device, as well as viewers who want to take advantage of the portability and especially of the mobility of the various devices shown in Fig. 2.

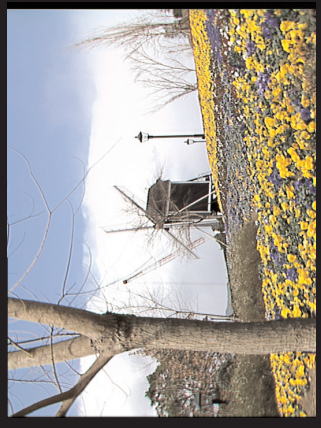
ZDF-digitext, which is suitable for multimedia and interactive usage, completes the multiplex with news, information, and an electronic program magazine. This new data service offers emerging forms of usage by adding small transmission channels, such as GSM, GPRS, or UMTS, to realize a back channel as shown in Fig. 3. With this extension it is possible to use general content over DTT and demand individual content via the back channel. In this way, the complete concept takes account of the convergence of broadcasting, telecommunication, and information. Young people using the internet are already forerunners in the telecommunication field and certainly an interesting target group in the DTT concept.

Conclusion

The changeover to digital terrestrial television offers a great chance to establish a new and successful system—German Television ZDF will take advantage of that opportunity.

THE AUTHOR

Albrecht Ziemer worked for various industry companies before joining German Television ZDF as managing director in 1984. In 1997, as executive vice-president of production and engineering, he became responsible for about 1,500 employees and an overall budget of about $250 million.



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