DVB-T in Bavaria
Technologie and Switch Over

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Bayerische Medien Technik GmbH
Introduction

DVB-T Technology and background

DVB-T: situation in Bavaria and Germany

Communications for DVB-T switch over
Bayerische Medien Technik

…we pave the way for digital broadcasting!
About bmt

- Bayerischer Rundfunk: public broadcaster in Bavaria with 5 Radio and 2 TV Stations, part of ARD
- BLM: Media authority for Bavaria, responsible for licensing radio and tv stations in Bavaria; initiate several projects in digital broadcast
- bmt was founded 1994: to realise the first DAB Pilot Project in Germany; 1998; DVB-T fieldtrial in Bavaria; 2005: DVB-T switch over

Development and service support for:

- Digital Radio data services
- DVB-T/DVB-S
- MHP Applications
- Traffic telematics
- Playout and transmission technology
- DRM etc.
DVB-T in Bavaria

Agenda

- Introduction
- DVB-T Technology and background
- DVB-T: situation in Bavaria and Germany
- Communications for DVB-T switch over
Why terrestrial digital broadcasting?

- Decrease of analogue terrestrial acceptance (<10%)
- Variety of programmes / new services
- Increase of video and audio quality
- Portable indoor reception
- Mobile reception (lower speed)
- Selective regional and local coverage
- Reduction of emission cost per program
- Effective use of frequency spectrum
- Redundancy in case of satellite failure / national security aspects
- Independence of cable operators
- Synergetic effects by use of existing infrastructure
- Basis for further developments (DVB-H)

TV in Bavarian Households 1/2006:

- 5.1% Terrestrial
- 43.8% Satellite
- 51.1% Cable
DVB-T technology

- DVB-T offers more than 120 different parameter combinations - only some are interesting
- for example “modulation”:
  - 64 QAM = roof antenna / 6 and more programs per channel
  - 16 QAM = portable reception / 4 programs per channel
  - QPSK = mobile reception / 2 programs per channel

- Conclusion: the coverage and reception goal has to be defined first!
Because of frequency economy and portable (mobile) reception the DVB-T-Version:

- Modulation: 16QAM
- Coderate: 2/3
- Guardinterval: 1/4
- Datarate: 13.3 Mbit/s

with 4 programmes per channel was chosen.

- Encoding: MPEG 2

- Polarisation vertical and/or horizontal (even mixed in SFN)

- The coverage forecast matched excellent. The Chester 1997 values were revised with additional safety values (10;5;10 dB/pi;po;stat.)
Whenever possible: SFN

selected transmitters in SFN should be equivalent (altitude, ...)

reuse of existing transmitter sites (high power) possible and efficient

portable indoor coverage requires sites near the center of the city

adjacent channel in digital is not a problem

antenna modification necessary at some sites (power over all/polarisation/age)

many analog turn-around-stations/gap-fillers (low power transmitters) can be reduced due to better coverage & reduction of coverage level
To days DVB-T transmitter sites:

- **Fernmeldeturm**
  - erp VHF = 25 kW
  - erp UHF = 25 or 50 kW

- **Olympiaturm**
  - erp VHF = 20 kW
  - erp UHF = 100 kW

- **Dillberg**
  - erp VHF = 25 kW
  - erp UHF = 50 kW

- **Wendelstein**
  - erp VHF = 25 kW
  - erp UHF = 100 kW
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To days DVB-T coverage (schematic):

München/Nürnberg:
- indoor 1.9/0.7 mio. inhabitants
- stationary 4.4/1.8 mio. inhabitants

Bayern (sum):
- indoor 2.6 mio. inhabitants (20%)
- stationary 6.2 mio. inhabitants (50%)

- portable indoor
- portable outdoor
- stationary
<table>
<thead>
<tr>
<th>Kanal 10</th>
<th>Kanal 35</th>
<th>Kanal 56</th>
<th>Kanal 34</th>
<th>Kanal 48</th>
<th>Kanal 66</th>
</tr>
</thead>
<tbody>
<tr>
<td>102,5 MHz</td>
<td>586 MHz</td>
<td>754 MHz</td>
<td>578 MHz</td>
<td>690 MHz</td>
<td>834 MHz</td>
</tr>
</tbody>
</table>

Das Erste®  
Phönix  
Sat1  
T5  
3sat  
Alpha  
II  
ESPN

arte  
KàKA  
Südwest Fernsehen  
Vox  
HSE 24

plus  
Datendienst *  
hr  
Super  
N24  
münchen.tv

* MHP
### DVB-T Channels in Munich

<table>
<thead>
<tr>
<th>Channel</th>
<th>Frequency</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Das Erste Wendelstein</td>
<td>K 10</td>
<td>Digital</td>
</tr>
<tr>
<td>RTL München</td>
<td>K 24</td>
<td>Digital</td>
</tr>
<tr>
<td>DSF München</td>
<td>K 27</td>
<td>Digital</td>
</tr>
<tr>
<td>ZDF München</td>
<td>K 35</td>
<td>Digital</td>
</tr>
<tr>
<td>Tele 5 München</td>
<td>K 37</td>
<td>Digital</td>
</tr>
<tr>
<td>RTL 2 München</td>
<td>K 40</td>
<td>Digital</td>
</tr>
<tr>
<td>ProSieben München</td>
<td>K 45</td>
<td>Digital</td>
</tr>
<tr>
<td>tvm München</td>
<td>K 51</td>
<td>Digital</td>
</tr>
<tr>
<td>BFS München</td>
<td>K 56</td>
<td>Digital</td>
</tr>
<tr>
<td>Sat.1 München</td>
<td>K 59</td>
<td>Digital</td>
</tr>
<tr>
<td>Tele5/Eurosport/HSE</td>
<td>K 66</td>
<td>Digital</td>
</tr>
</tbody>
</table>

Note: Analog channels are marked as X and SFN channels are marked with an asterisk (*).
DVB-T in Bavaria

DVB-T Receiver in the german market

Set-top-boxes approx. 80 €

IDTV approx. 800 €

Portable IDTV approx. 200 €

PCMCIA/USB approx. 90 €
DVB-T in Bavaria >>

DVB-T in Germany

- DVB-T on air
- DVB-T on air (public broadcasters only)
- DVB-T start in May 2006
- DVB-T start in 2006

Public broadcasters: 90% of inhabitants covered until end 2008

Partly different programs in the regions

March 1st, 2006
Problems

- Set-top-boxes did not show optimal behaviour in early days
- Man made noise in VHF-Band / portable indoor reception --> UHF
- "over-range" and interference depending on weather conditions
- Different manufacturers in one SFN (northern Germany)

... however the network is running very well!
Outlook: DVB-Handhelds

- Transmission "Mixed Mode"
- Video: MPEG 4 / H.264: 3 x DVB-H in stead of 1 x DVB-T
- Kick off: 15th of May 2006 (next Monday)
- DVB-H Receiver: only prototypes
- New multiplexer / software key for the transmitter
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Communication

- Analog switch off - no simulcast
- no advertisement - only information (competitors)
- focus on public relations (press, radio, tv)
- all players worked together (project bureau)
- presentations for dealer, antenna installers, cable operators, building industry
- info-packet for dealers
- callcenter
- videotext
- newsticker with switch off information/scrolled text on screen
DVB-T in Bavaria >>

Communication

- Internet
- “coverage tool” with postcode
More information (in German)

www.bmt-online.de and www.ueberallfernsehen.de

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Thank you for your attention.