



Practical experience gained during the introduction of digital terrestrial television broadcasting (DTTB) in Germany

The switchover in Berlin-Brandenburg

The German TV Market



DVB-T: DasÜberallFernsehen

- 36.2 million TV households
- More than 25 channels in German language are distributed
- TV advertising turnover 7249 million EUR in 2002

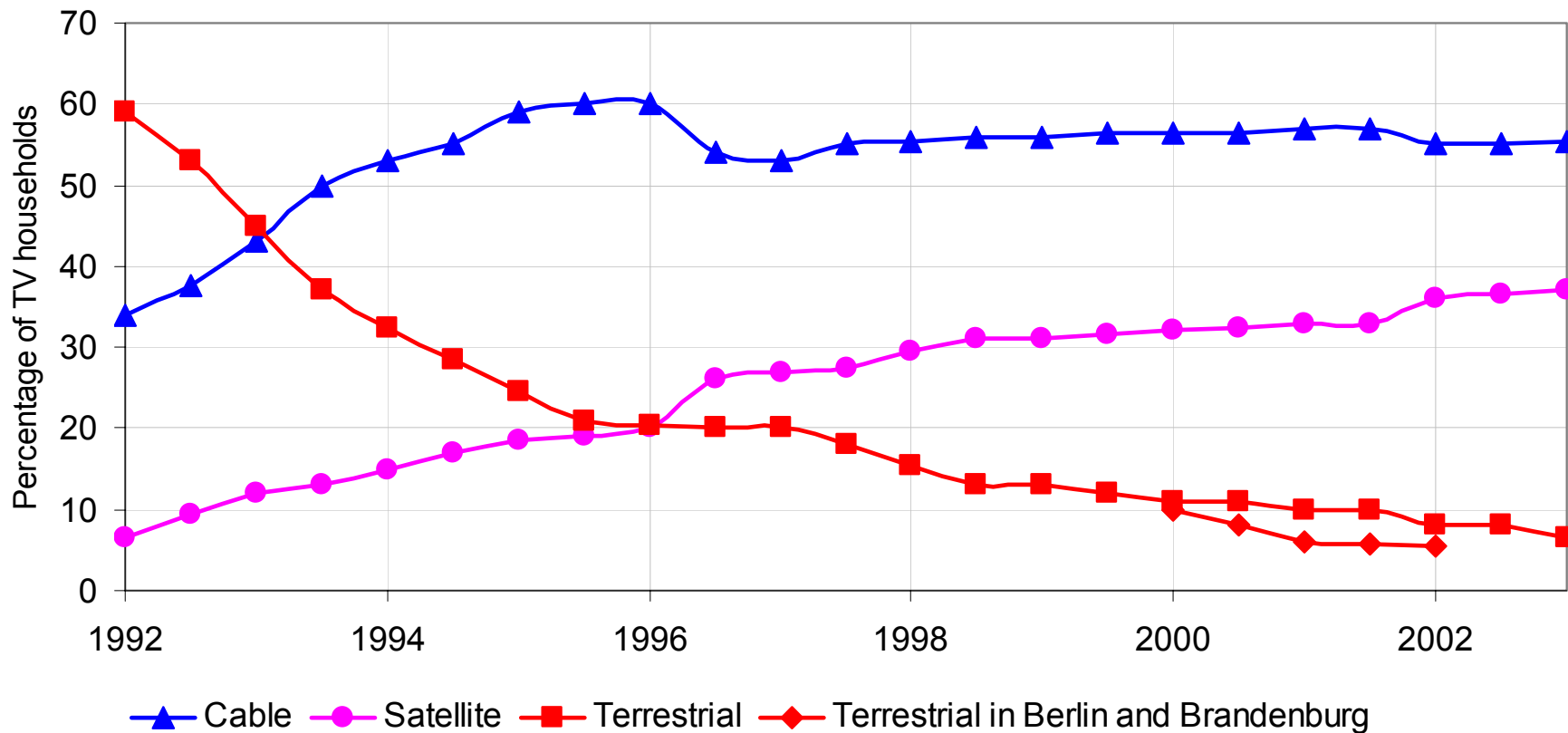
The audience has the following choices:

- Terrestrial with 3 to 12 channels free to air
- Cable with more than 30 analogue and digital channels for a monthly cable fee of about 12 - 15 EUR
- Satellite with more than 35 free to air analogue and digital channels
- Additional Pay-TV offers, starting from 5 EUR per month

The Decline of Terrestrial Reception in Germany and Berlin / Brandenburg



DVB-T: DasÜberallFernsehen



Source: AFG/GfK Fernsehforschung, Methodenbericht und ARD

Total costs for analogue terrestrial distribution: approx. 250 mill. EUR p.a.

Analogue Terrestrial TV Networks in Germany

Transmitters in Operation before Digitisation



DVB-T: DasÜberallFernsehen

In total, more than 9000 TV broadcast stations are in operation in Germany :

- over 300 high power stations
- over 9000 low power stations

	Public broadcasters			Commercial broadcaster				
	ARD	ZDF	ARD3	RTL	Sat.1	Pro7	VOX	other
High power stations	94	104	119	88	104	37	44	23
Low Power stations	2821	2869	3048					
Coverage of population [%]	99.3	98.9	98.7	65.5	36.5	15.3	11.4	< 3

Source: IDR 2000

DVB-T Pilot Projects

Practical Experience since 1995



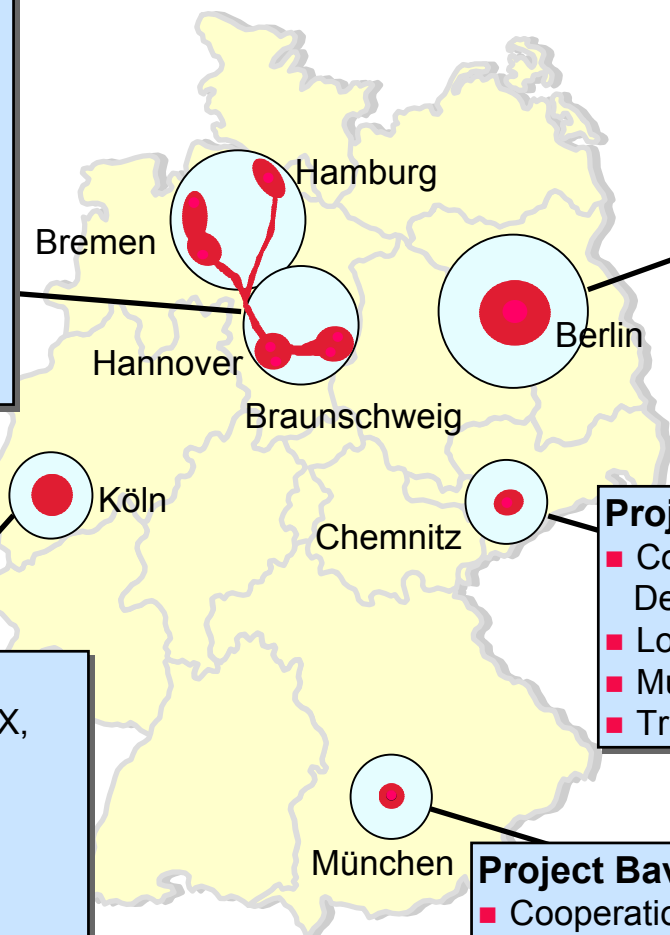
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Project North Germany

- Cooperation between the Media Institutes, the Technical University of Braunschweig, NDR, ZDF, RB and Deutsche Telekom
- 26 transmitters, MFN, 2k FFT
- Multi Media Mobile M³ Presentation during Expo 2000
- Data Broadcast Applications, e.g. Internet Push Services with telematics and tourist information

Project Berlin

- Cooperation between MABB / GARV, Deutsche Telekom and SFB
- 6 DVB-T networks for Berlin in trial operation with 20 TV programmes, 2k and 8k
- Data Broadcast Applications
- Market research in 1999



Project Saxony

- Cooperation between SLM and Deutsche Telekom
- Local programme distribution
- Multiplex management
- Trial operation suspended end of 2000

Project North Rhine-Westphalia

- Cooperation between RTL, SAT1, VOX, VIVA and Deutsche Telekom
- MFN 2k FFT, SFN repeater
- Mobile reception
- Statistical multiplex
- Market research 1999
- Trial operation suspended end of 2000
- VHF trial network operated by WDR

Project Bavaria

- Cooperation between IRT, BMT, BR, R&S and Deutsche Telekom
- SFN – field trials

Launch Scenario 2000

Recommendations Concerning DTTB



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The “Digital Broadcasting” Initiative on the digitisation of radio and television recommended:

- The analogue TV transmission should end as soon as possible, at the latest in 2010
- The simulcast phase must be kept as short as possible
- Portable indoor reception is to be made possible right from the beginning - albeit not necessarily in rural areas
- From the beginning at least 12 programme equivalents, later at least 20
- A picture quality comparable to PAL
- Starting digitisation in regions (islands) with high population density
- Successive increase of the number of DTTB islands
- The islands and the right moment for the switchover are identified by the Länder (Federal States)

English version available at <http://www.bmwi.de>

Intention of Germany for the Nation-wide DTTB Coverage after the RRC 04/06



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Full area coverage of the whole country with (at least) 6 DVB-T networks:

- 3 coverages intended for public broadcasters
- 3 coverages intended for commercial broadcasters

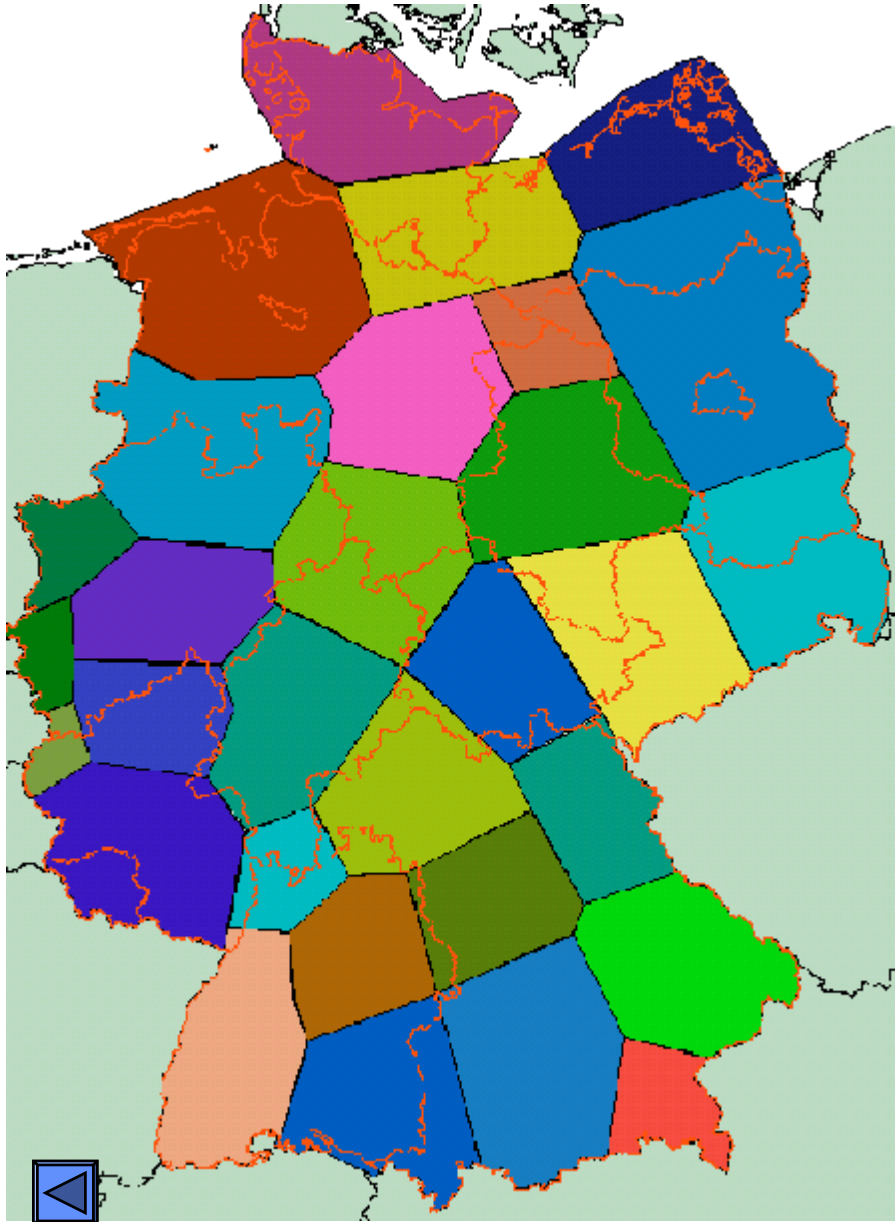
with following intended structures

- 1 nation-wide, federal state boundaries have not to be respected (e.g. ZDF)
- 4 nation-wide, federal state boundaries have to be respected (ARD, 3 x commercial)
- 1 nation-wide, federal state boundaries have to be respected, regional (ARD 3)





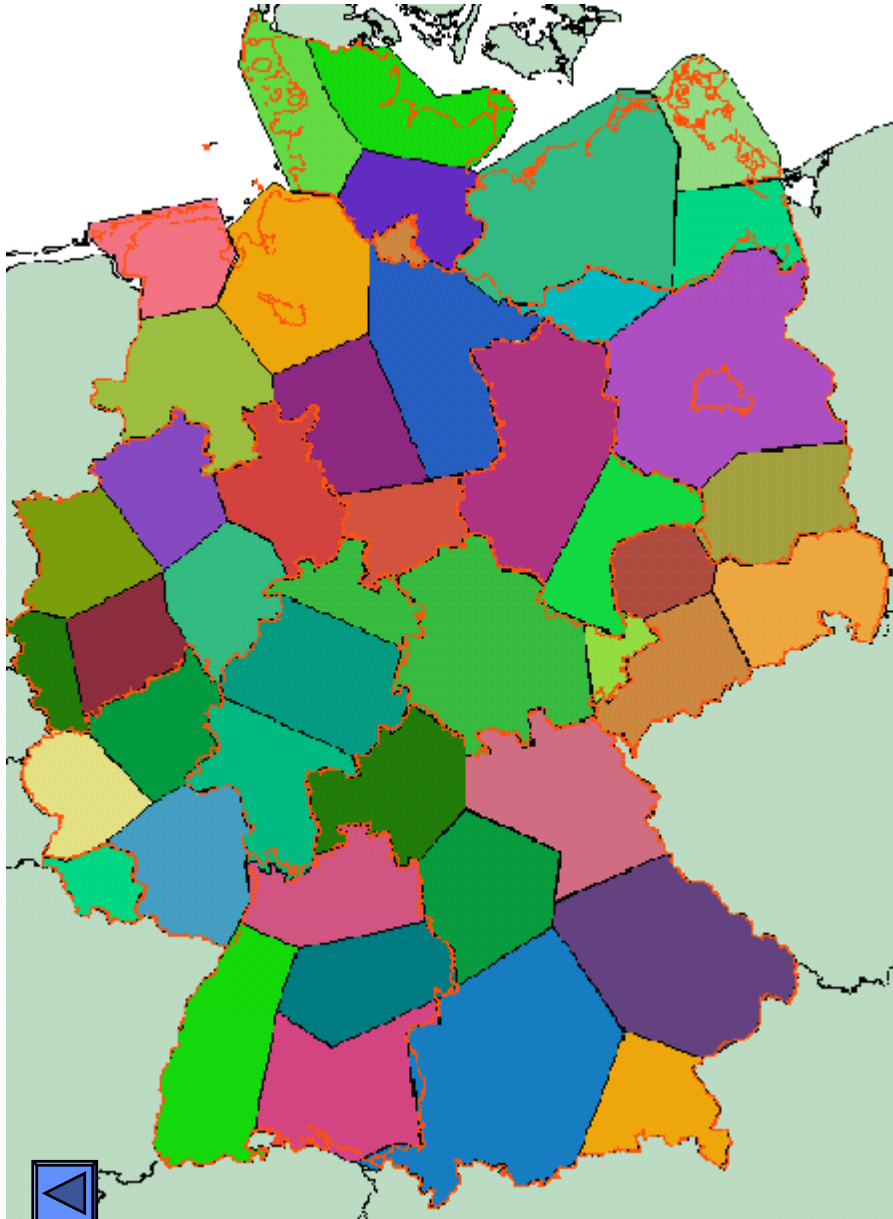
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Possible structure of the layer for the public broadcaster ZDF



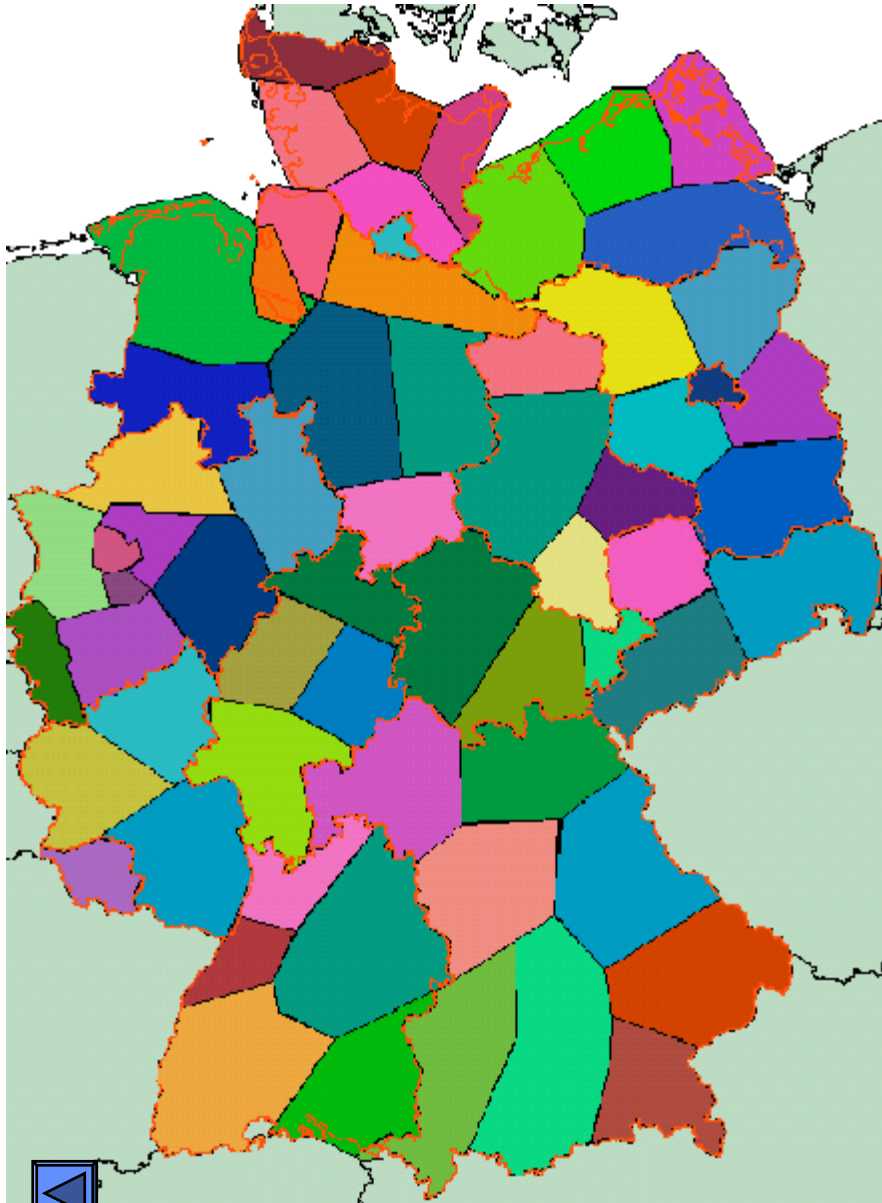
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Possible structure
of a layer for
commercial
broadcasters or
for the public
broadcaster ARD



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Possible structure
of the layer for the
regional public
broadcaster
(ARD 3)

The Switchover - Island by Island

Forced Switch Off after a Short Simulcast

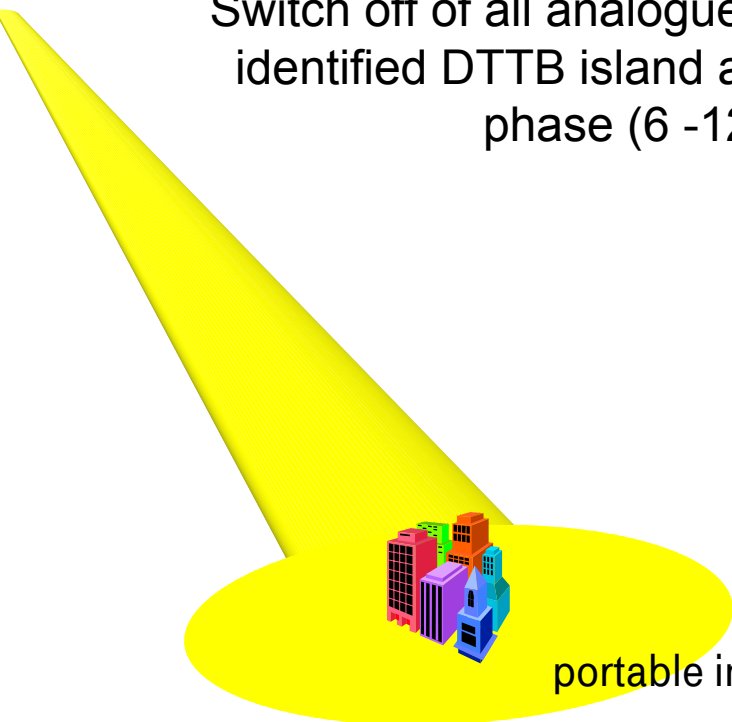


DVB-T: DasÜberallFernsehen

Switch over step by step

Independent start of DTTB in areas (islands)
with a high density of population

Switch off of all analogue TV transmitters in the
identified DTTB island after a short simulcast
phase (6 -12 months)



portable indoor

portable outdoor / fixed reception

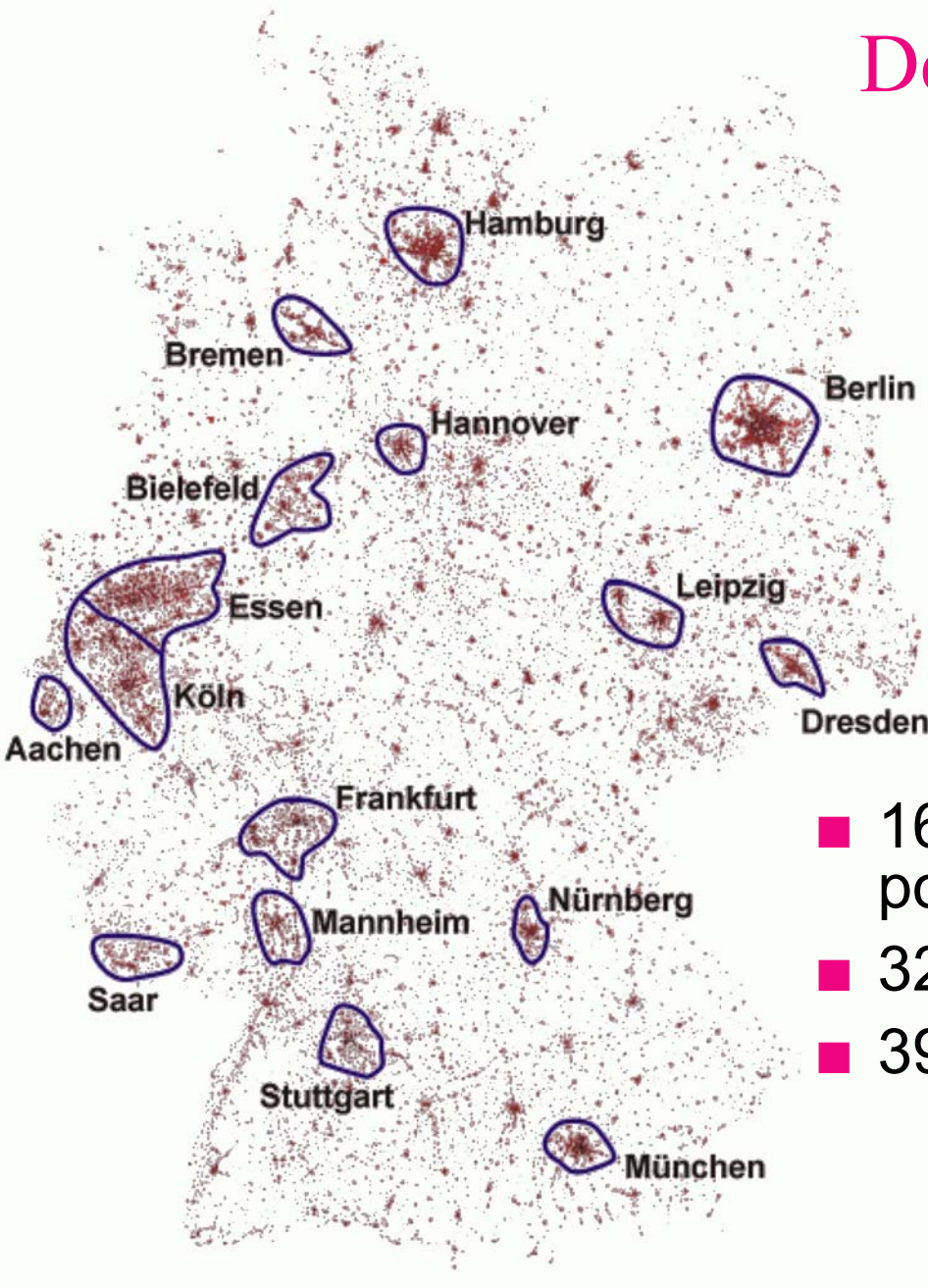


Coverage of the whole country

Density of Population in Germany



DVB-T: DasÜberallFernsehen



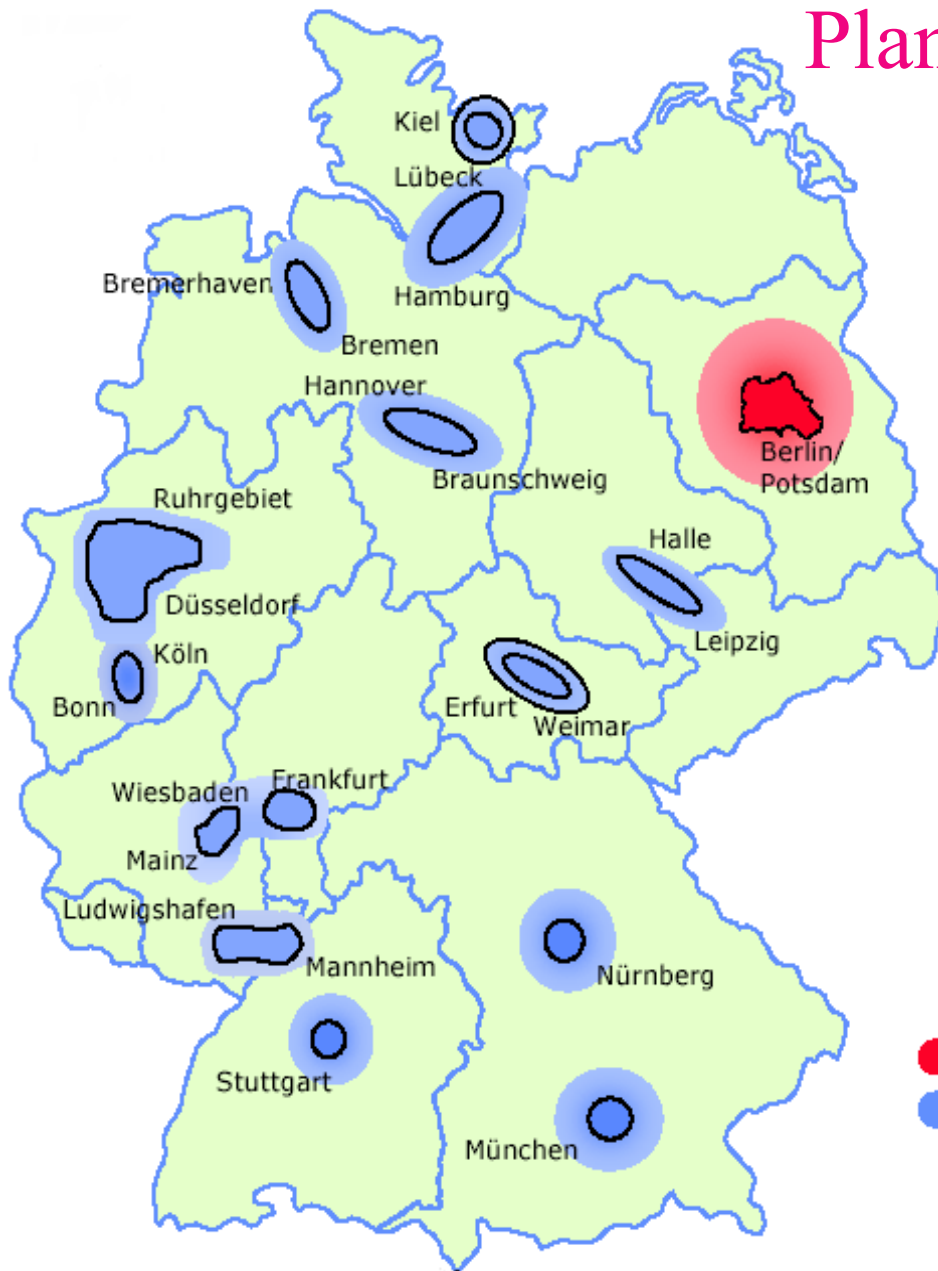
This map gives an example of possible DTTB islands in Germany, investigation 1999

- 16 areas with a high density of population
- 32 million potential viewers
- 39 % of the population of Germany

Planned DTTB Islands in Germany



DVB-T: DasÜberallFernsehen



This map gives an up-to-date overview of planned DTTB islands in Germany

Next region Cologne-Bonn will start in summer 2004

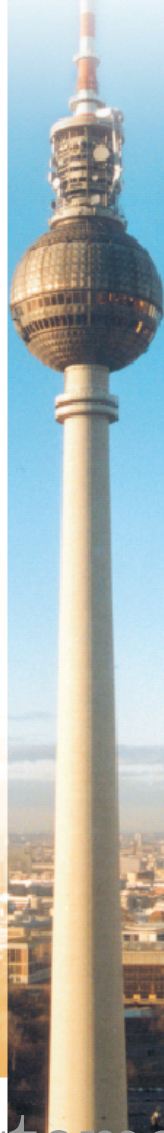
- In operation since November 2002
- Starting from 2004 until 2005 or 2006

Source: DVB-T-Projekte and IDR-BNA
Bayerische Medien Technik, www.bmt-online.de

Ö goes

Berlin digital

Easy.Everywhere.Television



By the summer of 2003, television broadcasts in the Berlin/Potsdam area are to switch completely from analogue to digital transmission. A Memorandum of Understanding to this effect was signed by ARD, ORB, SFB, ZDF, ProSiebenSAT.1 Media AG, RTL Television and the Berlin-Brandenburg regulatory authority for commercial broadcasting (MABB) on 13 February 2002, making the German capital the first area in Germany to undergo this switchover.

Digital terrestrial television (DVB-T) will take over completely from the traditional analogue terrestrial TV transmission under a decision taken by the German federal government on 24 August 1998. This was based on a recommendation tabled by the Digital Broadcasting Initiative (IDR), fixing the maximum period for switchover by 2010 at the latest.

More programmes, new services, reception everywhere

It is the viewers who will benefit above all from the switchover of terrestrial transmission to digital technology. The third route of transmission alongside cable and satellite will thus continue to be open for all. Viewers who have so far not opted for satellite or cable, currently receive 12 services via analogue transmission. Following switchover of the pilot transmissions which commenced in 1997 in the Berlin-Potsdam region, to high-performance transmitters, they will receive in excess of 20 television services anywhere in the coverage area. All programmes and services will be available to the homes without the need for an additional aerial or CATV system.

Terrestrial television transmitters to be switched over to digital technology

Many services currently available only via cable or satellite, including PHOENIX, Kinderkanal, Super RTL, Kabel 1 or N24 will then see their first terrestrial transmission. Furthermore, new digital services offered by the broadcasters will also be available, e.g. ZDF.doku and ZDFinfo.

A further advantage: Unlike with cable, viewers will not have to meet any fixed costs, nor will they need to carry out any extensive installations as is the case with satellite reception. As a rule, a small rod aerial will be sufficient for high-quality reception of television images.

Digitization of terrestrial transmission is a precondition for the development and distribution of new services. Thanks to digitization, portable reception with portable receivers and even mobile reception in cars, buses and trains will be possible. Additional services accompanying television, e.g. an electronic programme guide, may also be offered.



The Memorandum of Understanding is signed

Berlin Goes Digital



DVB-T: DasÜberallFernsehen

February 13, 2002:

The agreement between the media law authority of Berlin-Brandenburg (mabb), the public broadcasters ARD, ORB, SFB and ZDF and the commercial broadcasters ProSiebenSAT.1 Media AG and RTL Television on the switchover to DTTB in Berlin and Potsdam is signed.

DTTB in Berlin and the City of Potsdam

A New TV Age Begun



DVB-T: DasÜberallFernsehen



Launch Ceremony on October 31, 2002 with the managing directors of the public broadcasting corporations, the association of private broadcasters and the media law authority of Berlin-Brandenburg

- Two SFN networks cover Berlin and the city Potsdam in portable indoor quality, distributing 8 TV programmes.

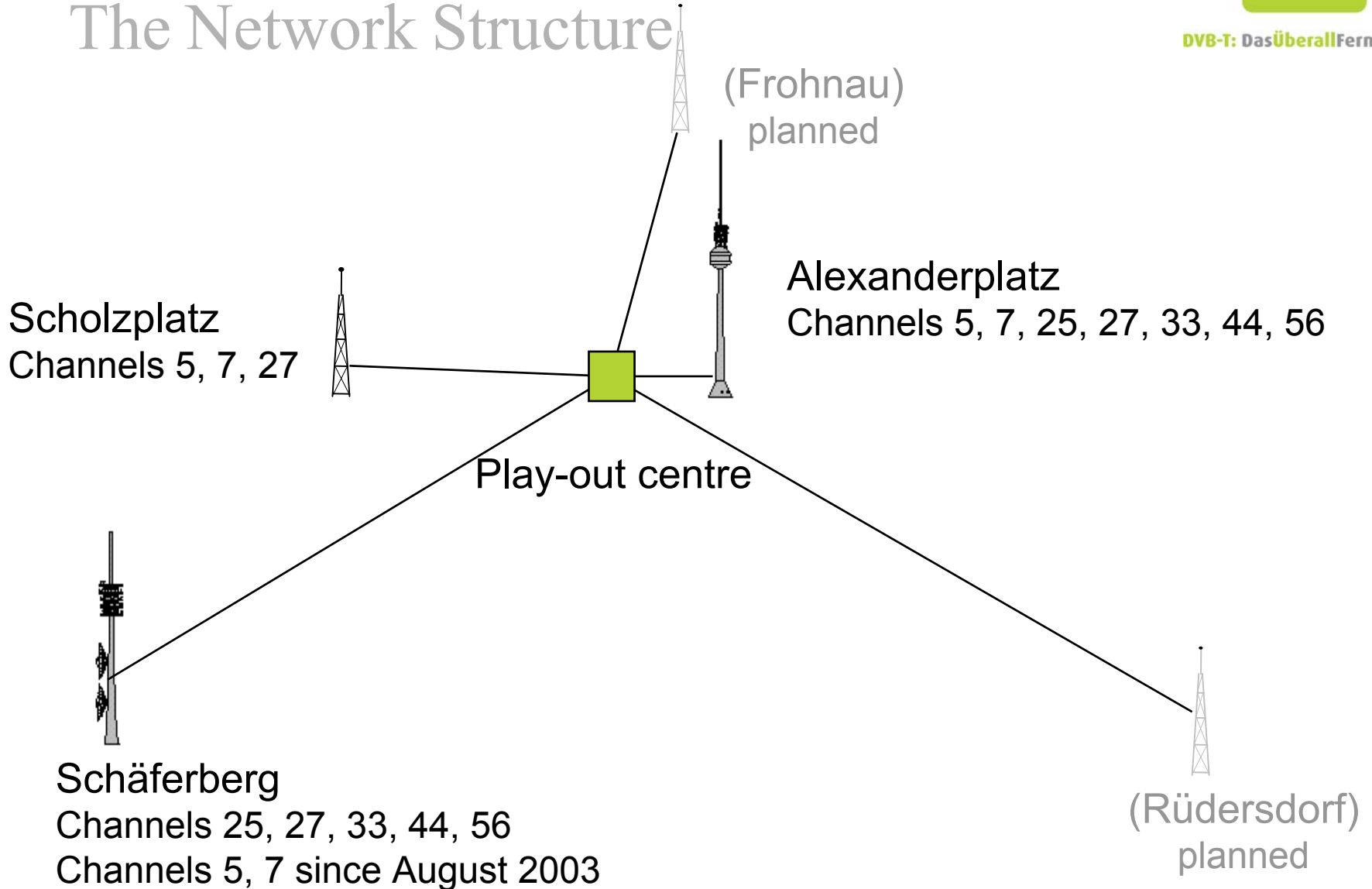
Kanal 5				
Kanal 44				

DTTB in Berlin and the City of Potsdam

The Network Structure



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DTTB in Berlin and the City of Potsdam

Prediction of the Coverage Area



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Channel 5, SFN

16 QAM, FEC 3/4, 1/8 GI

Coverage target

indoor, outdoor and fixed location probability 95 %

Transmitter sites

Alexanderplatz 10 kW e.r.p.

Scholzplatz 10 kW e.r.p.



Portable indoor reception

Portable outdoor reception

Fixed antenna reception



DTTB in Berlin and the City of Potsdam

Prediction of the Coverage Area



DVB-T: DasÜberallFernsehen






Channel 44, SFN
16 QAM, FEC 2/3, 1/8 GI

Coverage target
indoor, outdoor and fixed
location probability 95 %

Transmitter sites

Alexanderplatz	120 kW e.r.p.
Schäferberg	50 kW e.r.p.

-  Portable indoor reception
-  Portable outdoor reception
-  Fixed antenna reception

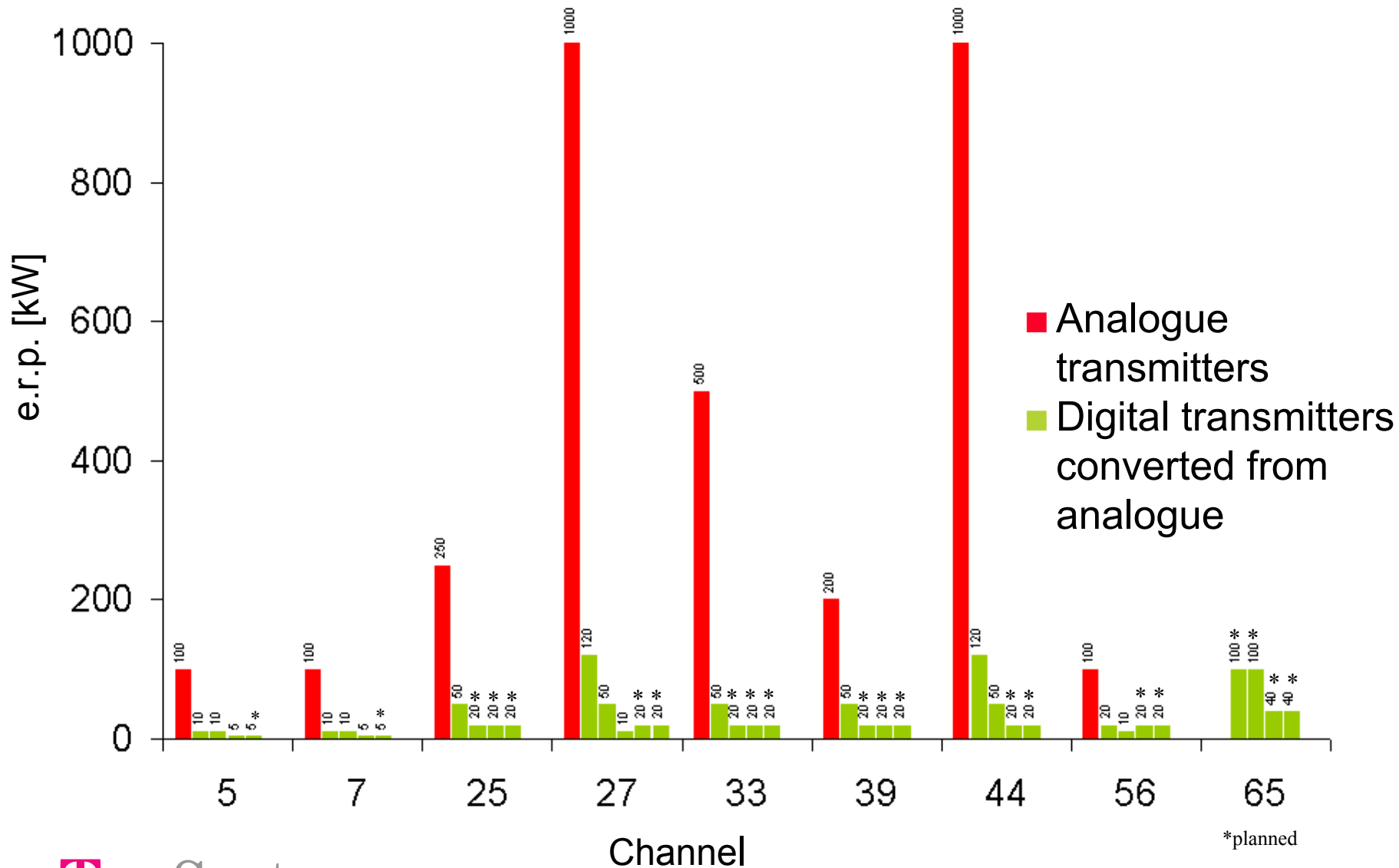


DTTB in Berlin and the City of Potsdam

Conversion from Analogue to Digital



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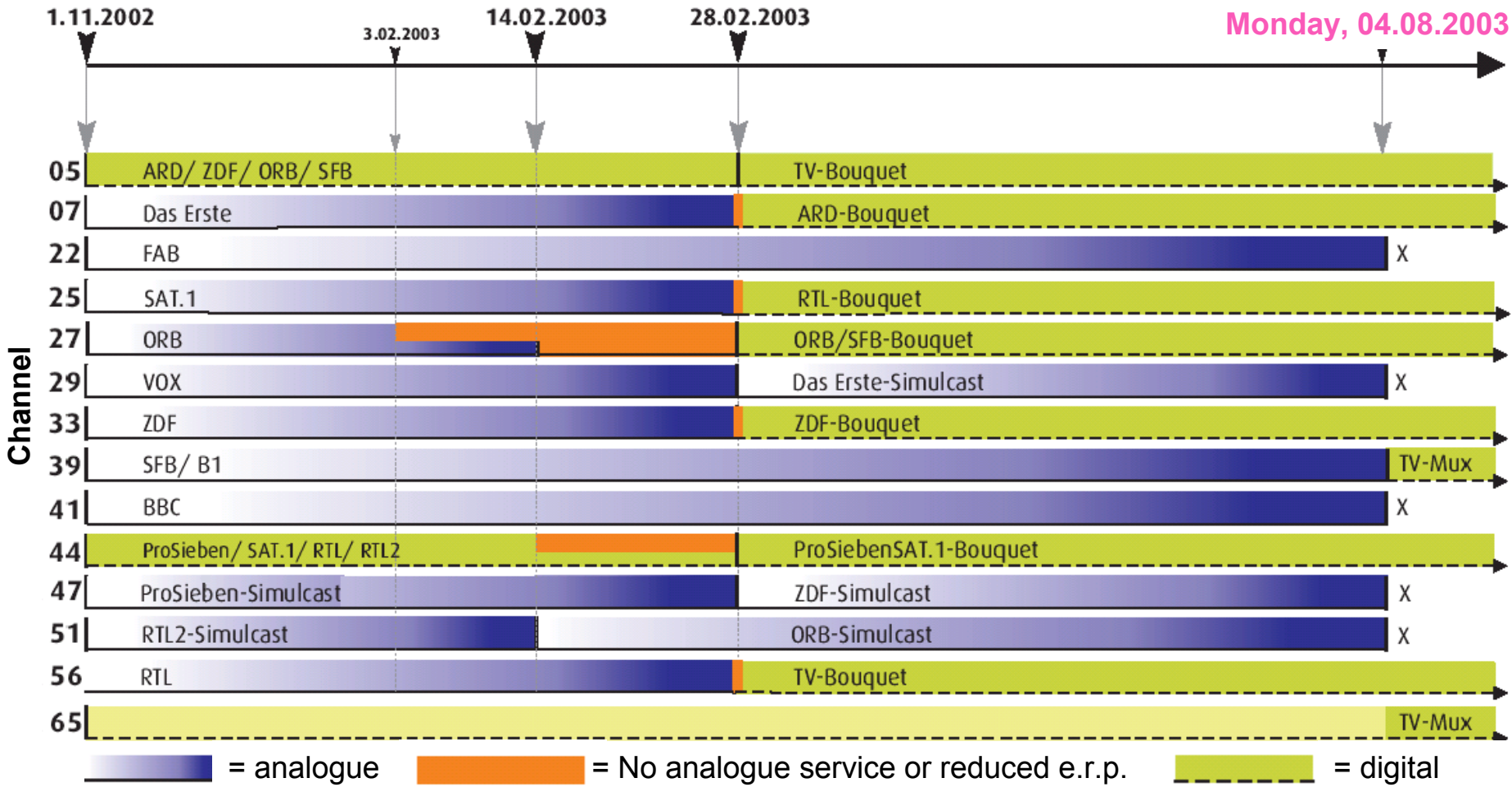


DTTB in Berlin and the City of Potsdam

The Switchover from Analogue to Digital



DVB-T: Das Überall Fernsehen



X = Channel no longer in use

DTTB in Berlin and the City of Potsdam

Technical Parameters of the Networks



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Channel Frequency	5 177.5 MHz	7 191.5 MHz	25 506 MHz	27 522 MHz	33 570 MHz	44 658 MHz	56 754 MHz
Transmitter sites e.r.p. polarisation*	Alexanderplatz 10 kW Schäferberg 5kW -V Scholzplatz 10 kW	Alexanderplatz 10 kW Schäferberg 5kW -V Scholzplatz 10 kW	Alexanderplatz 20 kW Schäferberg 50 kW	Alexanderplatz 120 kW Schäferberg 50 kW Scholzplatz 10 kW -V	Alexanderplatz 20 kW Schäferberg 50 kW	Alexanderplatz 120 kW Schäferberg 50 kW	Alexanderplatz 10 kW Schäferberg 20 kW
Modulation	16-QAM	16-QAM	16-QAM	16-QAM	16-QAM	16-QAM	16-QAM
Code rate	3/4	2/3	2/3	2/3	2/3	2/3	2/3
Guard interval	1/8	1/8	1/8	1/8	1/8	1/8	1/8
Net bit rate [Mbit/s]	14,51	12,90	14,75	14,75	14,75	14,75	14,75

* if not indicated horizontal polarisation, V means vertical polarisation

DTTB in Berlin and the City of Potsdam

TV Programmes Channel by Channel



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5	7	25	27	33	44	56

DTTB in Berlin and the City of Potsdam

First Results



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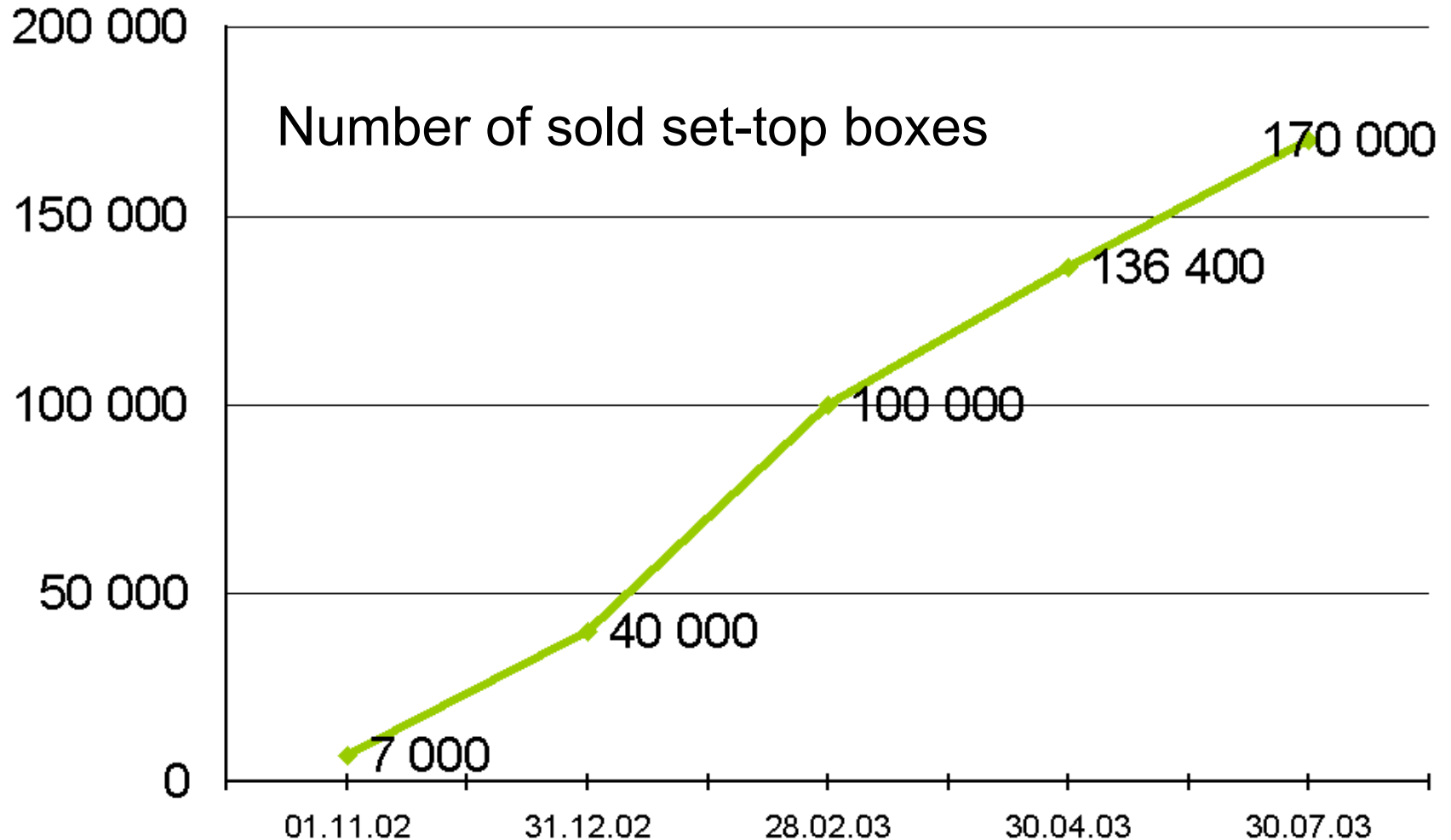
- No serious handling and reception complaints
- Approx. 180 000 set-top boxes sold until end of August
- Over 30 different receiver types are on the market
- Positive press feedback
- Coverage prediction corresponds very well with the results gained by measurements
- Mobile reception is possible with DVB-T in an SFN with an 16-QAM 8k-system

DTTB in Berlin and the City of Potsdam

Development of Sales of Set-top Boxes



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DTTB in Berlin and the City of Potsdam

First Experiences



DVB-T: DasÜberallFernsehen

- The transition from perfect reception to no reception is very rapid. Customers do not understand that.
- The receiving and handling quality of the set-top boxes varies widely
- The quality of antennae for portable reception is not very satisfactory
- Impulsive noise seems to be a problem in the case of portable indoor reception, especially in the VHF-Band
- The analogue Video Programming System (VPS) can not be used with existing analogue video recorders

DTTB in Berlin and the City of Potsdam

Conclusion



DVB-T: DasÜberallFernsehen

The launch of DTTB in Berlin has proven that:

- The switchover took place at the right time
- There is a market for DTTB, even if cable and satellite market share is big
- The island concept - forced switch off combined with extremely short simulcast phase for a few selected programmes - has proven as an adequate approach for the introduction of DTTB especially in areas with congested spectrum usage
- The technology is mature
 - from the receiver perspective (reliable, reasonable prices)
 - from a network operators perspective (coverage prediction, switch over of transmitter networks, SFN management)

Without a fast switchover DTTB in Germany would have no chance of being accepted by consumers and broadcasters

Additional Information



DVB-T: DasÜberallFernsehen

- General information www.bmwi.de
- Launch Scenario 2000* www.bmwi.de
- Report “TV2000” www.irt.de
- Special information www.ueberall-tv.de
- Berlin - Brandenburg www.garv.de
- Report “Berlin goes digital”* www.mabb.de
- Bavaria www.bmt-online.de
- Northern Germany www.dvb-t-nord.de
- Middle Germany www.digitalerrundfunk.de
- North Rhine -Westphalia www.lfm-nrw.de
- Baden-Württemberg www.lfk.de
- T-Systems* www.t-systems-mediabroadcast.com

* Information in English language available

Please use the embedded hyperlinks above

DVB-T: The **Everywhere** Television



DVB-T: Das **Überall**Fernsehen

Thank you for your kind attention!

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Convergence is our business