



# Strategy for the Transition from Analogue to Digital terrestrial Television in Germany

Speaker:

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# Transition from Analogue to Digital



- Reasons for the preservation of terr. broadcasting
- Current Situation
- „Digital Broadcasting“ Initiative IDR
- Coverage Targets
- „Green Field“ Plan
- Switch over Scenarios
- Outlook

# Why terrestrial digital broadcasting ?



- Decrease of analogue terr. acceptance (15%)
- Portable indoor reception
- Mobile reception at reasonable driving speed
- Selective regional and local coverage
- Variety of programmes / new services
- Reduction of emission cost per programme
- Effective use of frequency spectrum
- Redundancy in case of satellite failure
- Synergetic effects by use of existing infrastructure

# ARD/ZDF background ?



- Commitment to full area coverage (C; S & T)
- Cable situation for public broadcasters
- ARD strategy of programme linking
- Digital bouquets of ARD and ZDF
- Preservation of the frequency spectrum for broadcasting applications
- Dependence on someone else's network provider

# Available Frequency Spectrum for DVB-T

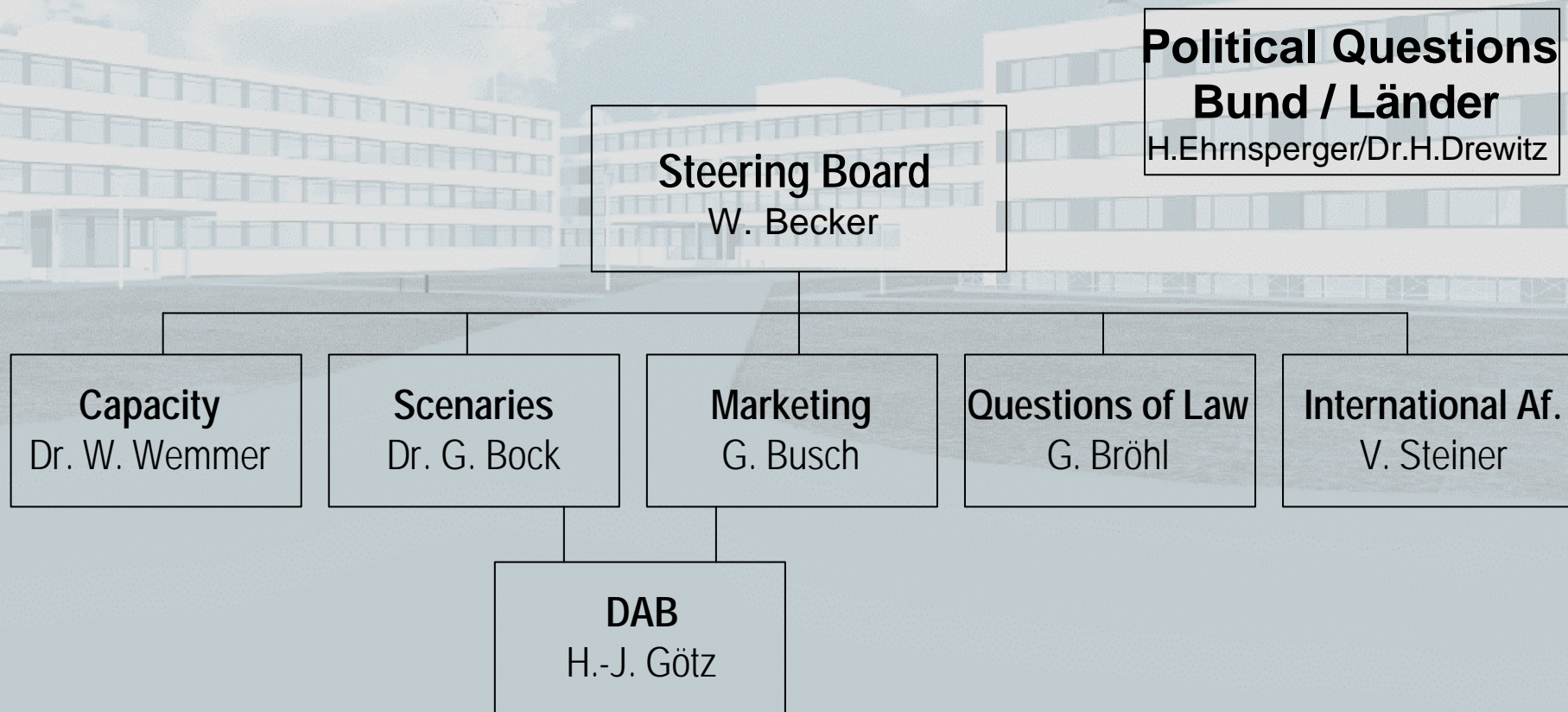


Frequency Band	Frequency Spectrum	Bandwidth	Channels
VHF – Band III Channel 5 - 10	174 - 216 MHz 42 MHz	7 MHz	6
UHF – Band IV/V Channel 21-60 Channel 64-66	470 - 790 MHz 814 - 838 MHz 344 MHz	8 MHz	43
<b>Band III-V</b>	<b>386 MHz</b>		<b>49</b>

# „Digital Broadcasting “Initiative IDR



Initiative of Bund and *Ländern* for Coordination of the Implementation of Digital Broadcasting (Dec. 1997)



# Coverage targets for DVB-T



- 12 TV-programmes with portable indoor reception and high coverage probability already in the starting phase
- Expandable to a minimum of 20 tv programme equivalents
- Transmission of multimedia services
- Regional programmes should be possible
- Mobile reception at reasonable driving speed
- Picture quality according to present analogue terrestrial tv
- HDTV should be possible (less programmes)

For these targets the whole frequency spectrum assigned to tv broadcasting is necessary

# Parameter of the DVB-T Versions



<b>DVB-T-Version</b>	<b>1</b>	<b>2</b>	<b>3</b>
Modulation (Coderate 2/3)	QPSK-2/3	16QAM-2/3	64QAM-2/3
Signal to noise ratio S/N [dB]	11	17	23
Bitrate [Mbit/s] with $T_g = T_u/4$ (8k)	6.6	13.3	19.9
Possible number of programmes	1 – 2	4	5



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**Because of frequency economy and portable (mobile) reception the DVB-T-Version 16QAM-2/3 with 8K Mode has been chosen**

# Minimum Fieldstrength



Band / Frequency	VHF/200 MHz	UHF/500 MHz	UHF/800 MHz
	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB $\mu$ V/m]
Fieldstrength with reception by directional aerial in 10 m height			
<b>Analogue TV</b>	57	67	72
<b>DVB-T / 16 QAM-2/3</b>	45	50	54
Fieldstrength for portable indoor reception			
<b>DVB-T / 16-QAM-2/3</b>	71	81	85

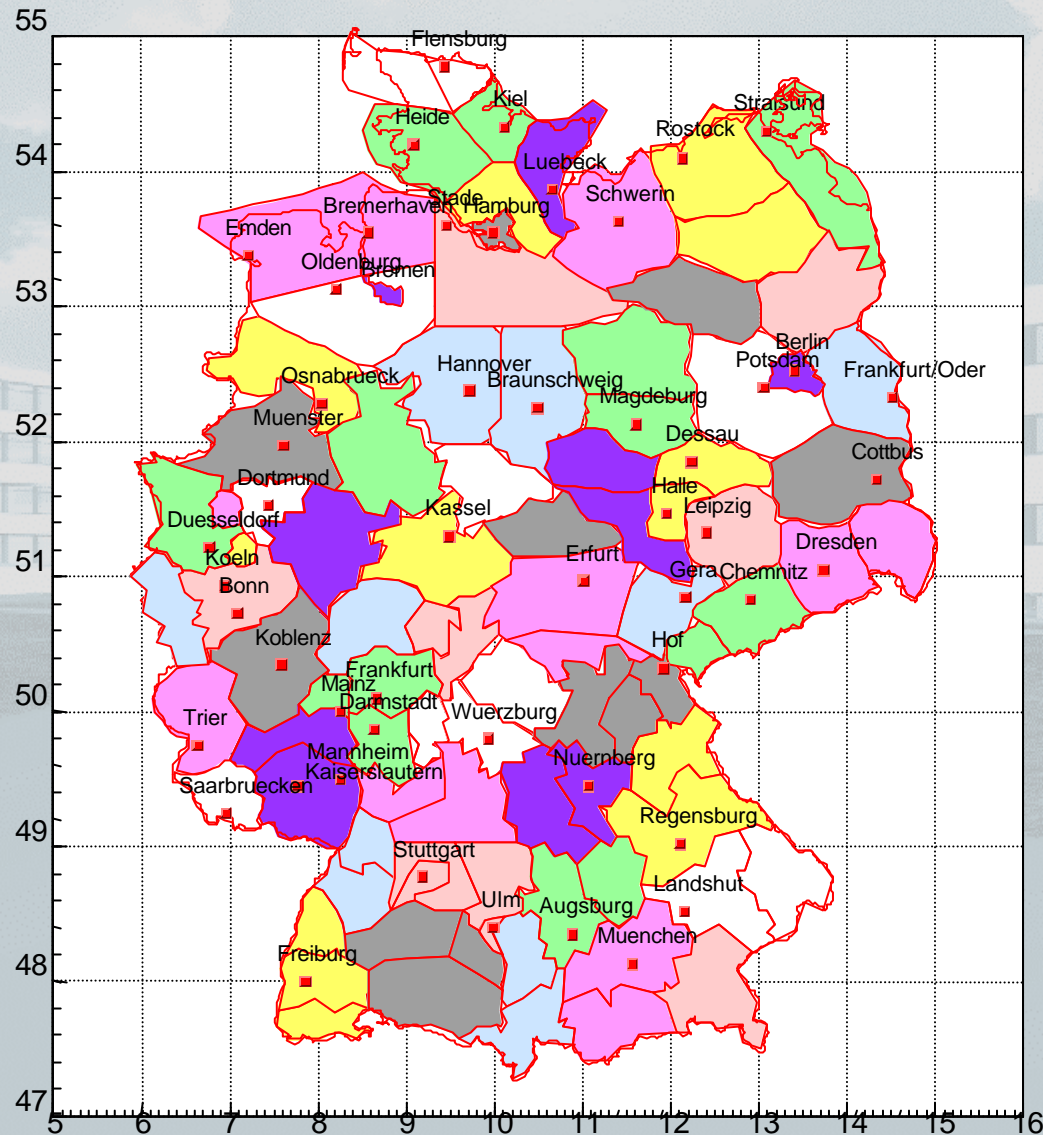
**Result:** for portable indoor reception a field strength increase of approx. 14 dB is necessary with respect to the analogue reception.

# Channel Requirements „Green Field Plan“

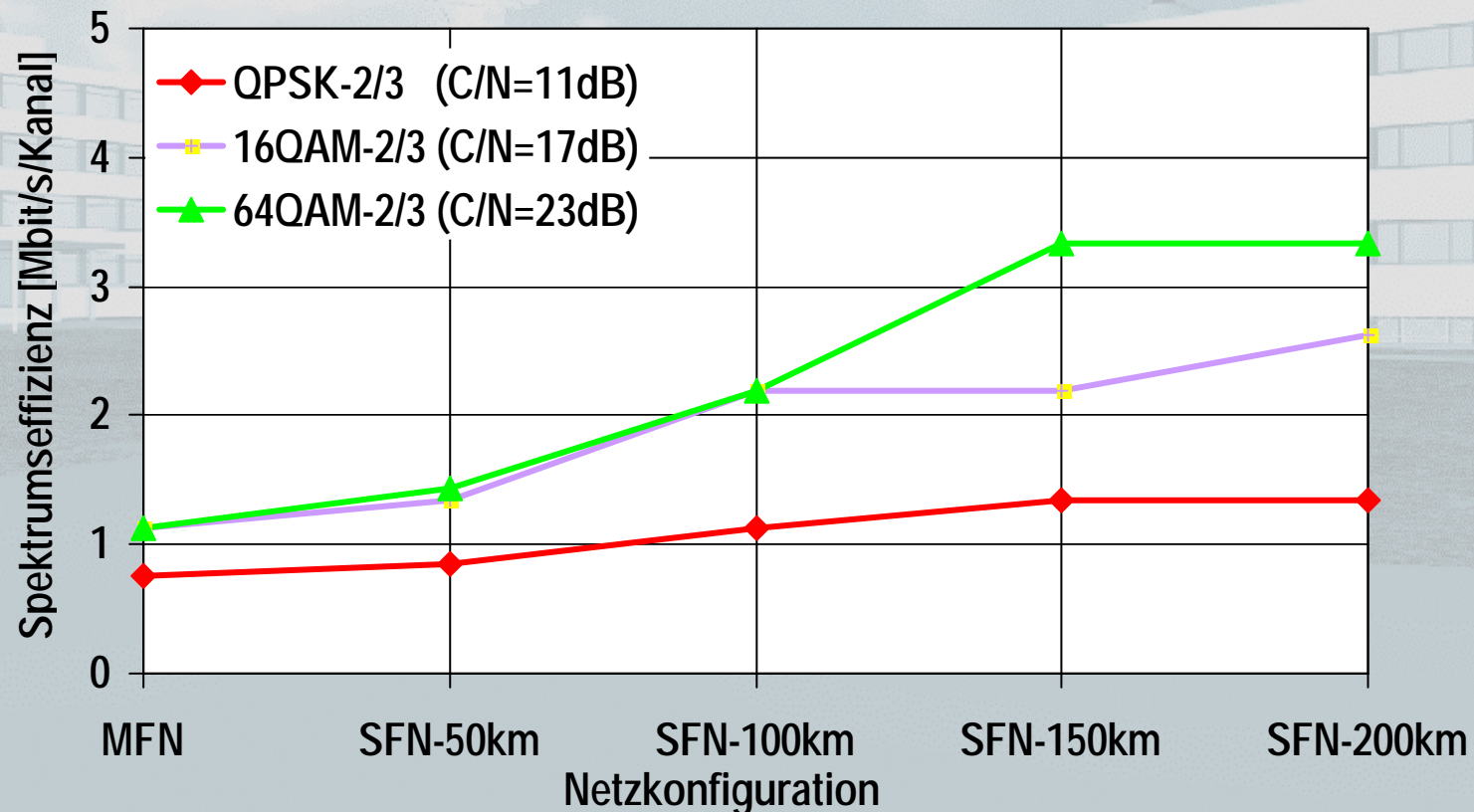


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Usable bit rate in Mbit/s		6.6	<b>13.3</b>	19.9
number of programmes		1-2 *	<b>4</b>	5
Reuse distance in km		52	<b>73</b>	99
SFN	Number of areas			
Channel requirement Division in Federal States	16	4	(5)	(6)
Channel requirement Division in regions	62	7	<b>8</b>	(10)
Channel requirement Division in sub-regions	100	10	11	14

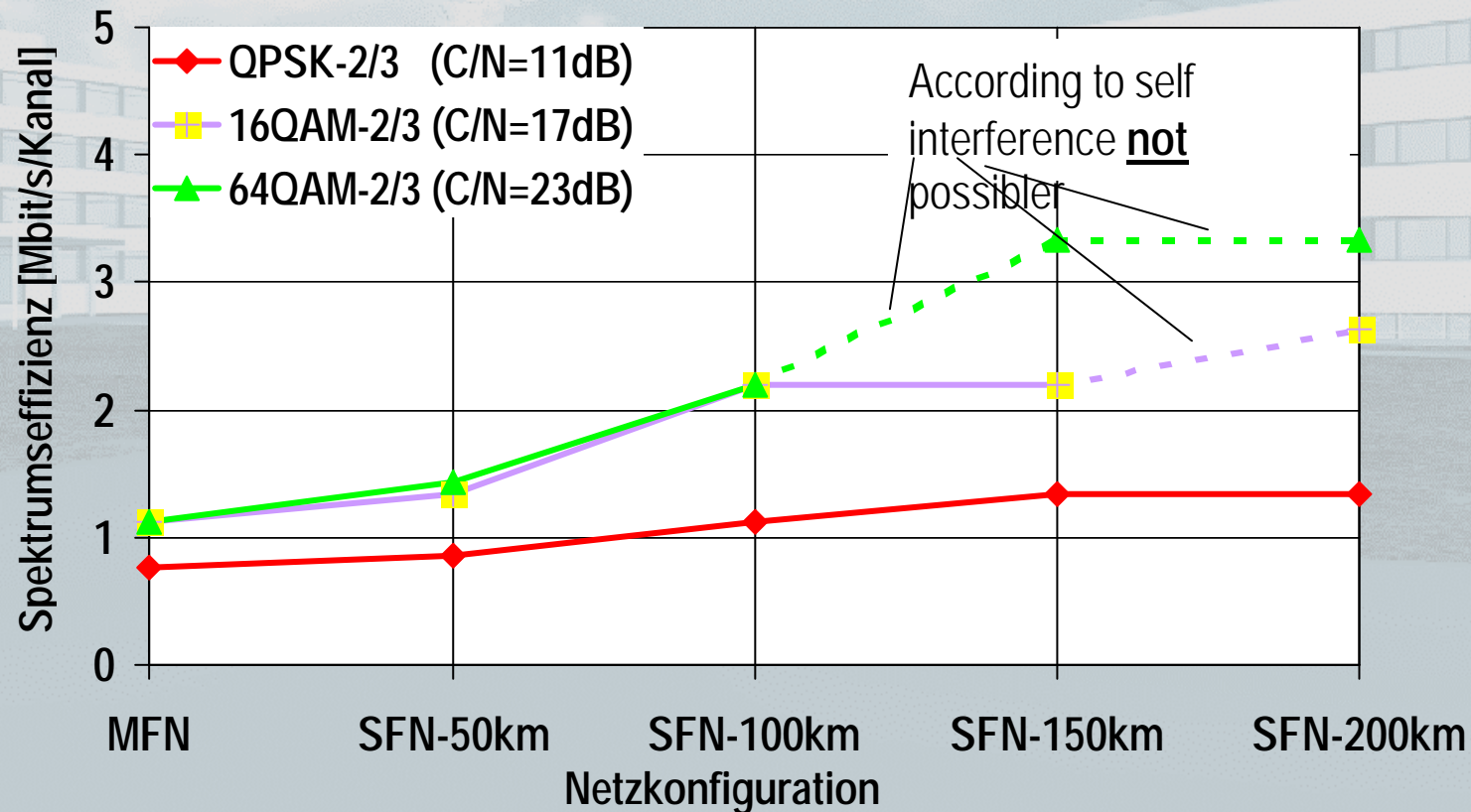
# Devision of Germany in 62 Regions



# Spectrum Efficiency of DVB-T Versions



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# Maximum Number of Programmes



<b>DVB-T-Version</b>	<b>QPSK-2/3</b>	<b>16 QAM-2/3</b>	<b>64 QAM-2/3</b>
Reception mode	Portable, Mobile	Portable, (Mobile)	Portable
Coverage area	Bundesländer	62 Regions	62 Regions
Channels per Multiplex	4	8	(10)
Number of multiplexes	12	6	(5)
Number of programmes / MUX	1 – (2)*	4	6
<b>Maximum # Programmes</b>	<b>12 – (24)*</b>	<b>24</b>	<b>24-30</b>

# DVB-T Pilots in Germany



1. <b>Berlin</b>	SFN 9 Transmitters	UHF	Telekom / MABB 5 MUX
2. <b>München</b>	SFN Netz 3 Transmitters	UHF	BMT (IRT; BR; Telekom) Testphase
3. <b>Niedersachsen Bremen, Hamburg</b>	MFN /SFN 26 Transmitters	UHF	NLM; RB; NDR; Telekom 2 MUX;
4. <b>NRW</b>	SFN 4 Transmitters	K10 UHF	WDR Planing phase
5. <b>Mitteldeutschland</b> Halle, Leipzig Erfurt, Weimar	? regular work	? 2001 ?	MDR; Telekom; ZDF; Landesmedienanstalt



# Switch over Scenarios



- **1.Simulcast operation covering the whole service area**  
(Reception with roof-top aerial)
- **2.Hard switch over from analogue to digital distribution**
- **3.Digital conurbation television with simulcast**
- **4.Hard insular switch over of 3 transmitter chains to distribute 12 programmes with portable indoor reception**
- **5.Hybrid solution**  
*Start with simulcast operation of 12 programmes in selected insular areas*  
*Cutoff of the complete analogue programme distribution in the insular areas according to prior agreement*

# Hybrid solution as proposed switch over scenario



## **The IDR recommends the insular switch over with a short simulcast period (in some areas with none):**

- For each insular area 3 high power transmitter are used digitally and broadcast 12 free-tv programmes (Chester 97)
- In selected areas a short simulcast phase is necessary for reasons of consumer protection
- After a short period (max 5 years) all analogue transmitters are switched off simultaneously in the whole area. The former „analogue frequencies“ are brought into the process of change over
- In the central insular area portable indoor reception should be possible from the beginning
- The switch over of the first insular areas should not restrict the growing together of the insular areas to a complete service area
- The complete growing together takes place successively according to the „green field“ planning (SFN / Revision Stockholm 61)

# Outlook



- Election of the start-regions during year 2000/2001  
(decision: *Bundesländer* governments)
- Transition of the pilot-projects to regular work, start in 2001
- Clearing telecommunication law restriction (TKG) for the switch over period
- Revision of „Stockholm 61“ (new frequency plan in Europe)
- Implementation of the „green field plan“ after revision of „Stockholm 61“ (start in 2006 ?)
- Complete switch over until the end of 2010 ?

# Digital terrestrial Television Start and switch over scenarios

I thank you for your attention