

Media&Broadcast.
 DVB-H System Solution

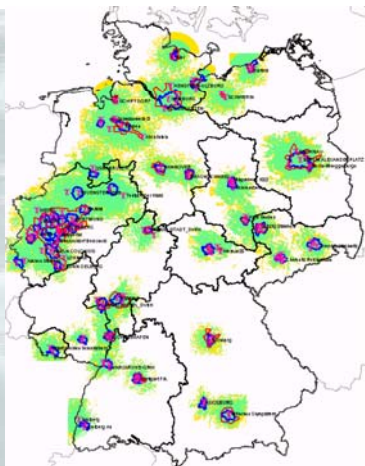
A Fully hosted solution, including

- Network and coverage planning
- Roll-out planning according to customers needs, allowing flexibility
- Concept for signal distribution
- Implementation - launch and further roll-out
- Network operation
- Customer care

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DvB-H Roll-out Planning Germany 2007



- Planning for the foreseen roll-out Q4/2007 has already been started
 - Based on population coverage
 - Network planning
 - Head-end/IPDC system
 - Contribution and distribution networks

portable outdoor reception			
Location probability	pop coverage		
	Million	%	
> 95 %	40	49	
> 70 %	46	57	
<= 70 %	36	43	

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 Network and Roll-out Planning.

Network Planning:

- strictly followed parameters given by the Customer
- based on a 5" by 5" raster (about 150m by 150m)
- performed for Channel 40

Parameters for indoor	Urban	Suburb. & Rural
Modulation & Code Rate	QPSK	QPSK
Coverage Probability	95%	95%
Required C/N	12 dB	12 dB
Mobile Antenna Gain	-7.96 dBi	-7.96 dBi
LogNormal Fading Sigma	7.8 dB	7.8 dB
LogNormal Fading Margin	12.8 dB	12.8 dB
Building Penetration Loss	17.2 dB	14.2 dB
Min. Outdoor Median FS	84.0	81.0

Roll-out Planning:

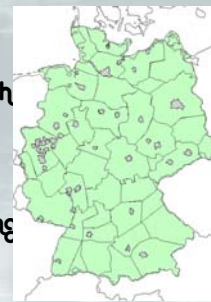
- Is based on expected frequency availability
- Implementation for launch could be fast because partly already in operation (e.g. Berlin), existing infrastructure for some other sites
- Will be fully supported during implementation, due to our
 - detailed knowledge of international requirements (GEO6)
 - our presence in national or international negotiations.

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 Broadcast Network.

Concept

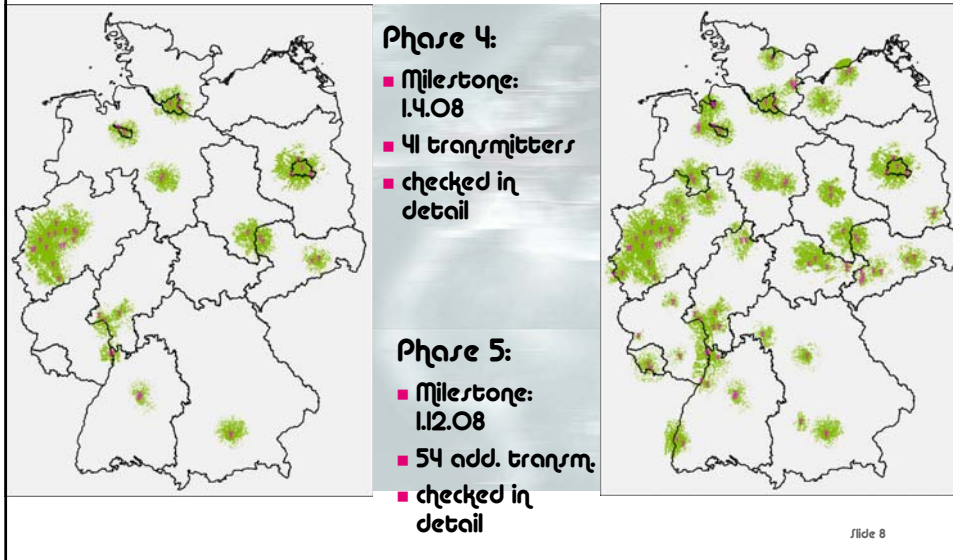
- is based on high-power transmitters mainly at existing broadcasting sites, complemented by transmitters with moderate power;
- is organized in 25 different networks (SFN), following the German allotment plan;
- meets the requirements of the Customer, especially concerning pop-coverage and envisaged milestones;
- leads to cost efficient network deployments, better and faster service availability as well as high frequency efficiency.



	Phase 20%	Phase 30%	Phase 40%	Phase 46%
population covered	19,62 Mill.	27,02 Mill.	34,17 Mill.	37,99 Mill.
pop-coverage	23,9%	32,9%	41,6%	46,2%

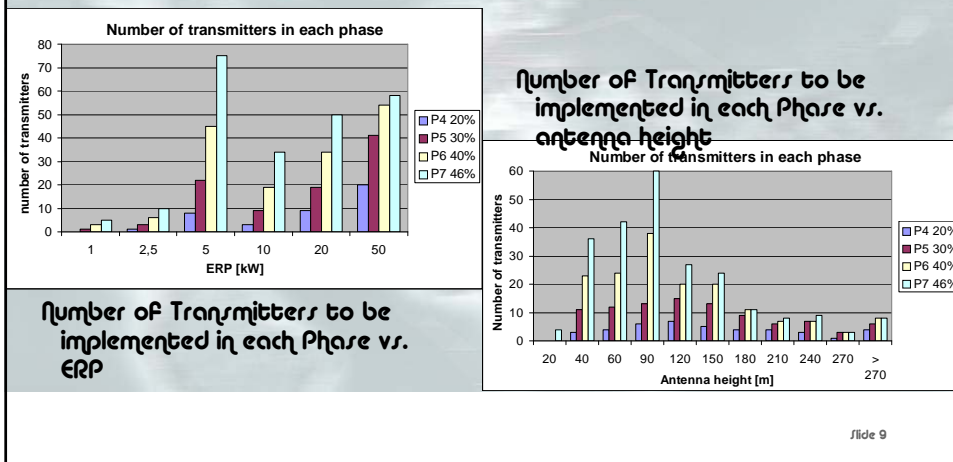
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 Network Planning - Details.

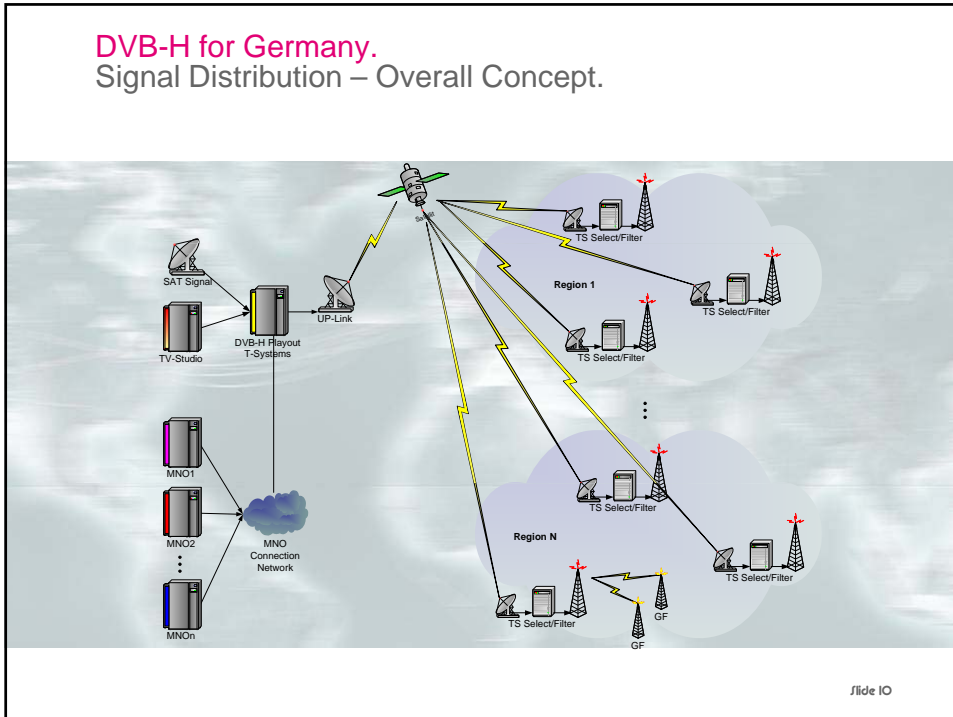


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 Network Planning - Details.

Transmitters, all Phases

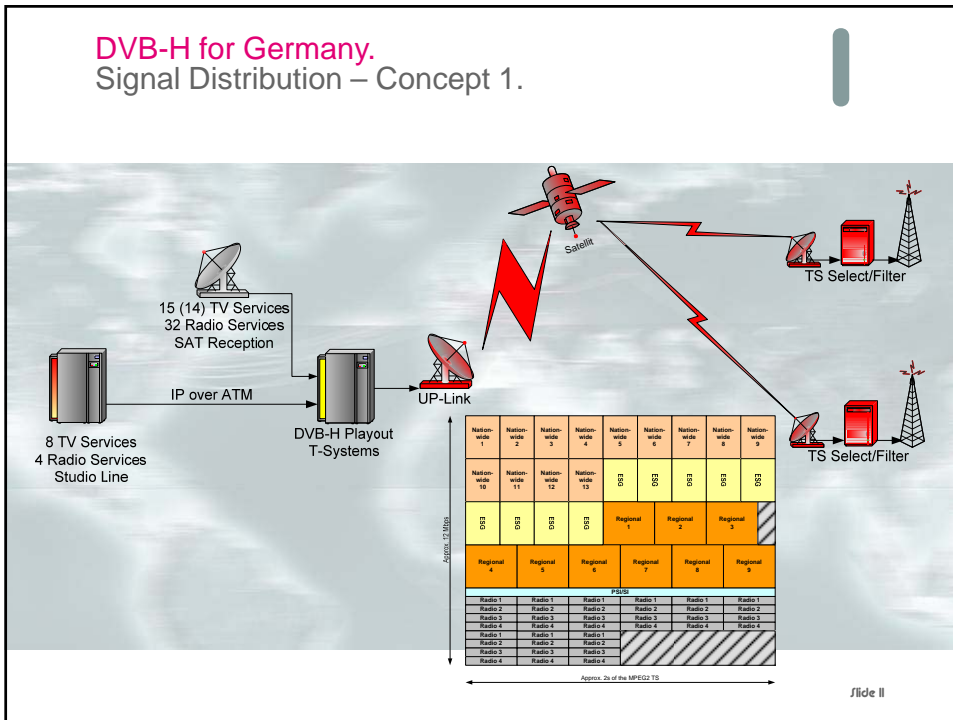


DVB-H for Germany.
 Signal Distribution – Overall Concept.



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DVB-H for Germany.
 Signal Distribution – Concept 1.



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DVB-H for Germany.
 Comparison of the different concepts

Feature	Basic Concept	Concept 1	Concept 2
Regionalization	No	Yes	Yes
TV Services overall (input)	16	23 (22)	23
TV Services per region	16	15 (14)	15
TV Services on satellite	16	23 (22)	135 (9x15) but 71 Encoder (8 + 9x7)
Radio Services overall (input)	0	36	36
Radio Services per region	0	4	4
Radio Services on satellite	0	36	36
Data Rate on Satellite in Mbps (rounded)	5	12	45 (9 x 5)

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 Implementation.

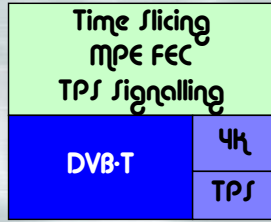
- **DVB-T Transmitter Equipment with Combiner**
- **Installation UHF-Antenna**



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DvB-H vs. DvB-T



- Transport Layer (EN 301 192; EN 300 468)

- Time Slicing
- MPE FEC
- Definition of TPS Bits for additional Signalling

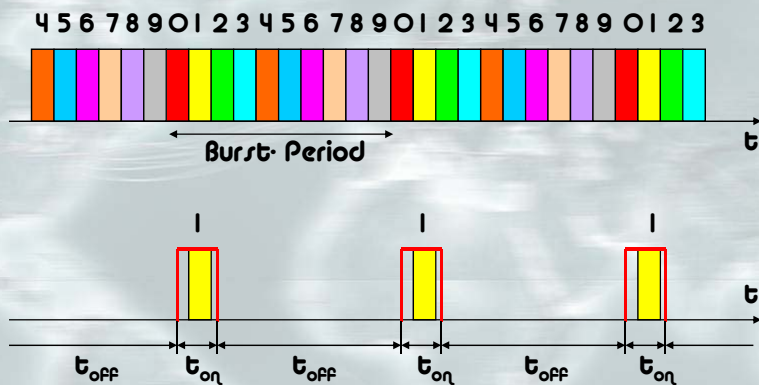
- Physical Layer (EN 300 744; TS 101 191)

- Identical to DVB-T in 2K and 8K Mode
- Enhanced physical layer features
 - 4k Mode
 - 8k / Native Interleaving
 - TPS Signalling

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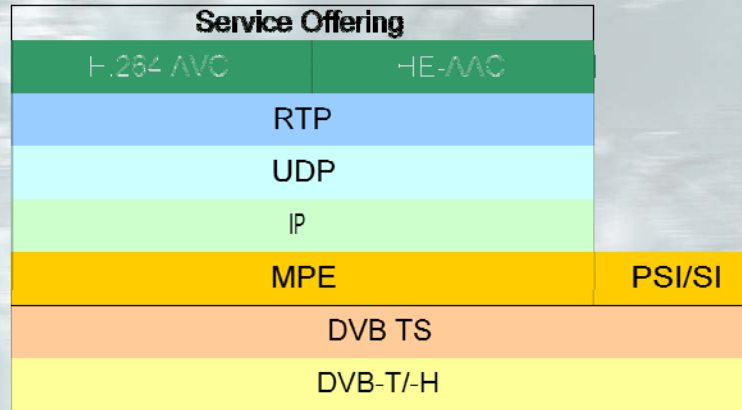
DvB-H Time Slicing



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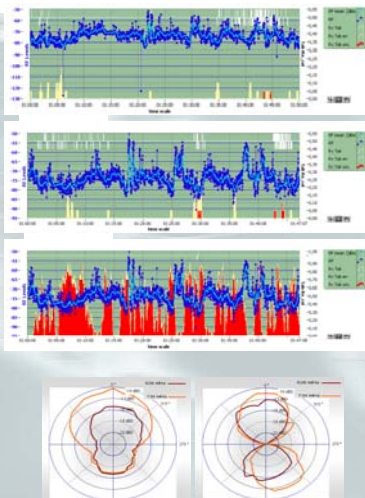
DvB-H Protocol Stack



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DvB-H Terminals



- Lab- and field trials with 6 different terminal types
- These trials gave interesting findings
- All tested terminals showed less sensitivity than assumed in current network planning
- Values range from -7dB up to -18dB less sensitivity in AWGN channel than required in the DVB-H implementation guideline (46,2dBuV/m)

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DvB-H Terminals



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DvB-H Trial Germany 2006



- 4 locations controlled by a central play-out @ T-Systems in Berlin
- Approx. 1000 handsets have been sent out to VIP users (press, politics, regulation)

Region	Transmitter	ERP in kW	Antenna Height in m	UHF-Chanel
Berlin	Alexanderplatz	20	358	39
	Schäferberg	50	205	39
Hamburg	HHT	50	254	53
	Höltigbaum	10	155	53
Hannover	Telexmax	20	276	40
München	Olympiaturm	20	284	38

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DvB-H Trial Germany 2006



- 14 TV Services
 - H.264AVC CBR @ 256kbps
 - QVGA 320x240 @ 12.5fps
 - Audio HE-AAC @ 64kbps
- 6 Radio Services
 - HE-AACv2 @ 64kbps
- ESG Automatic
 - DVB-IPDC (CBMS)
 - BMCO Profile 1
 - Bootstrapping
 - program plan import

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OMA-BCAST DRM / SC Profil.

Überblick.




- iBCrypt entspricht im wesentlichen dem OMA-DRM Profil.
- Verfahren unterscheiden sich wesentlich in Layer 1 und 2 des Protection Models
- Verfahren unterscheiden sich bei der Verarbeitung der Schlüssel im Terminal
- Das OMA-DRM Profil basiert auf OMA DRM 2.0 und besitzt ein trust model (CMMA)
- Das OMA SC Profil basiert auf der Nutzung einer (R) - USIM / CSIM und besitzt kein

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BCAST DRM / SC Profil.
 wichtigste Unterscheide.

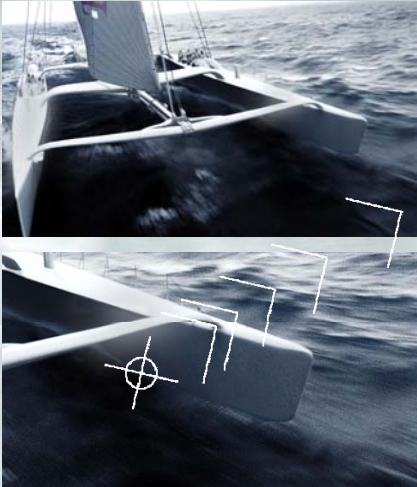
	DRM - Profil	SC-Profil
Rechte Beschreibung	OMA DRM 2.0	Mikey BCAST Extension
Authentisierung	ROAP	GBA
LTMK Transport Channel	ROAP	Mikey
Schlüssel Verarbeitung REK/SMK and LTMK	Terminal	USIM oder Terminal
LTMK	SEK prot. by REK, PEK prot. by SEK	PEK and SEK protected by SMK
STMK	DRM Profile spezifisch	SC Profile spezifisch



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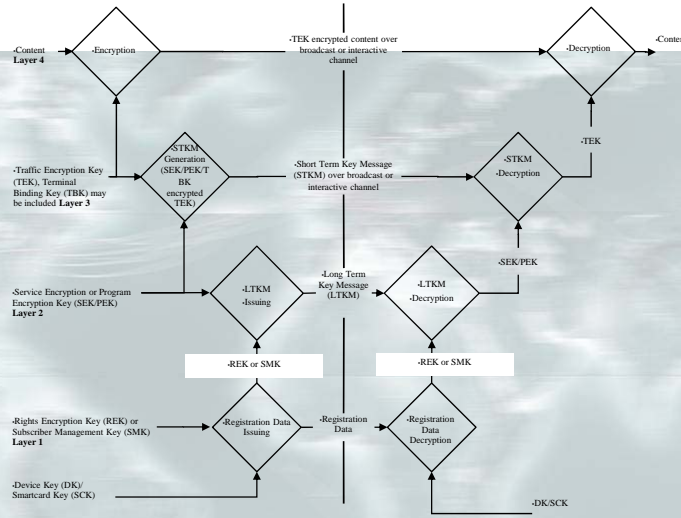
OMA-BCAST DRM / SC Profil.
 wichtigste Konsequenzen.

- DRM und SC Profil sind im Headend (Verschlüsselung) kompartibel (IPsec, SRTP oder ISM(Crypt))
- STMK's beider Verfahren können mit hoher Wahrscheinlichkeit über Simulcrypt Interface (mit modifizierten Encoder/Scrambler) eingespeist werden.
- Wenn DRM und SC Profil parallel betrieben werden sollen, müssen z.Z. pro Programm mindestens zwei Schlüsselströme mit abgestrahlt werden
- SC-Profil erfordert zur Subscription die Installation / Anbindung von 3G Komponenten.



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OMA-BCAST DRM / SC Profil.
 4-Layer Trust Model.



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 DvB-H Challenges



- OMA BCAST support (ESG, SCP)
- Interactivity
- Adaptation to the MNO infrastructures
- Statistical Multiplex on radio and TV services
- Roaming and handover
- Network planning optimization
- Network optimization (structure, GAP fillers)

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BCAST DRM / SC Profil.
Abkürzungen.



SKH - Smart Card Key (vom MNO/Kartenherstell
DK - Decice Key (von OMA / CMA)
SMK - Subscriber Management Key (Smartcard)
REK - Rights Encryption Key (OMA)
PEK - Program Encryption Key
SEK - Service Encryption Key
TBK - Terminal Binding Key
TEK - Traffic Encryption Key
STKM - Short Term Key Message
LTKM - Long Term Key Message
GBA - Global Bootstrapping Architecture
ROAP - Rights Object Acquisition Protokoll