The German Re-launch of DAB:

DMB – Interactive Multimedia Radio and Mobile TV

Making Digital Radio work: the German market perspective

T-Systems

T-Systems Media&Broadcast

Making Digital Radio work: the German market perspective

Based on the facts, that we:

- Have a very mature and efficient technology
- Free frequency ressources
- Devices with an attractive design for a reasonable price
- And the convergence of radio and mobile offering the opportunity of interactivity

is my key message today:

Let's take the opportunity and let' s start at the FIFA-World Championship 2006 with a new DAB network infrastructure in Germany dedicated to new services and offering the opportunity to develop new business models in the German broadcast market!

Mobile TV based on DMB, IFA 2005

The necessity of digitalization of radio is undisputed today.

Whereas program variety and freedom of opinion were the initial drivers,

we have come today to recognize that new appealing features of multimedia-applications will create new value for radio and new business opportunities.

The current situation - a potential El Dorado

- A DAB-network infrastructure with excellent coverage of > 80% in terms of population and surface exists!
- Implementation of VHF-band for wide area coverage and L-band for regional and local coverage.
- Growing variety of receivers with reasonable pricing
- Nearly 100 different programs on air
- A potential market of more than 80 Mio customers
- A closed FM - market with no access for new-comers

The down-side - a potential disaster

An excellent coverage and quality of FM

- Insufficient in-house reception due to regulated low transmission power
- Only little more than 100.000 receivers sold by now
- No sustainable business case for any regional program maker
- Little awareness of Digital Radio in the market

The consequence: A debate on technologies

The debate on technologies has mainly boiled down to opposing DAB/DMB to DVB-H, whereas generally spoken

DMB presents itself as a next stage of **DAB**, being
- compatible with DAB in terms of technology
- acceptable to the market
- leading radio into the age of multimedia

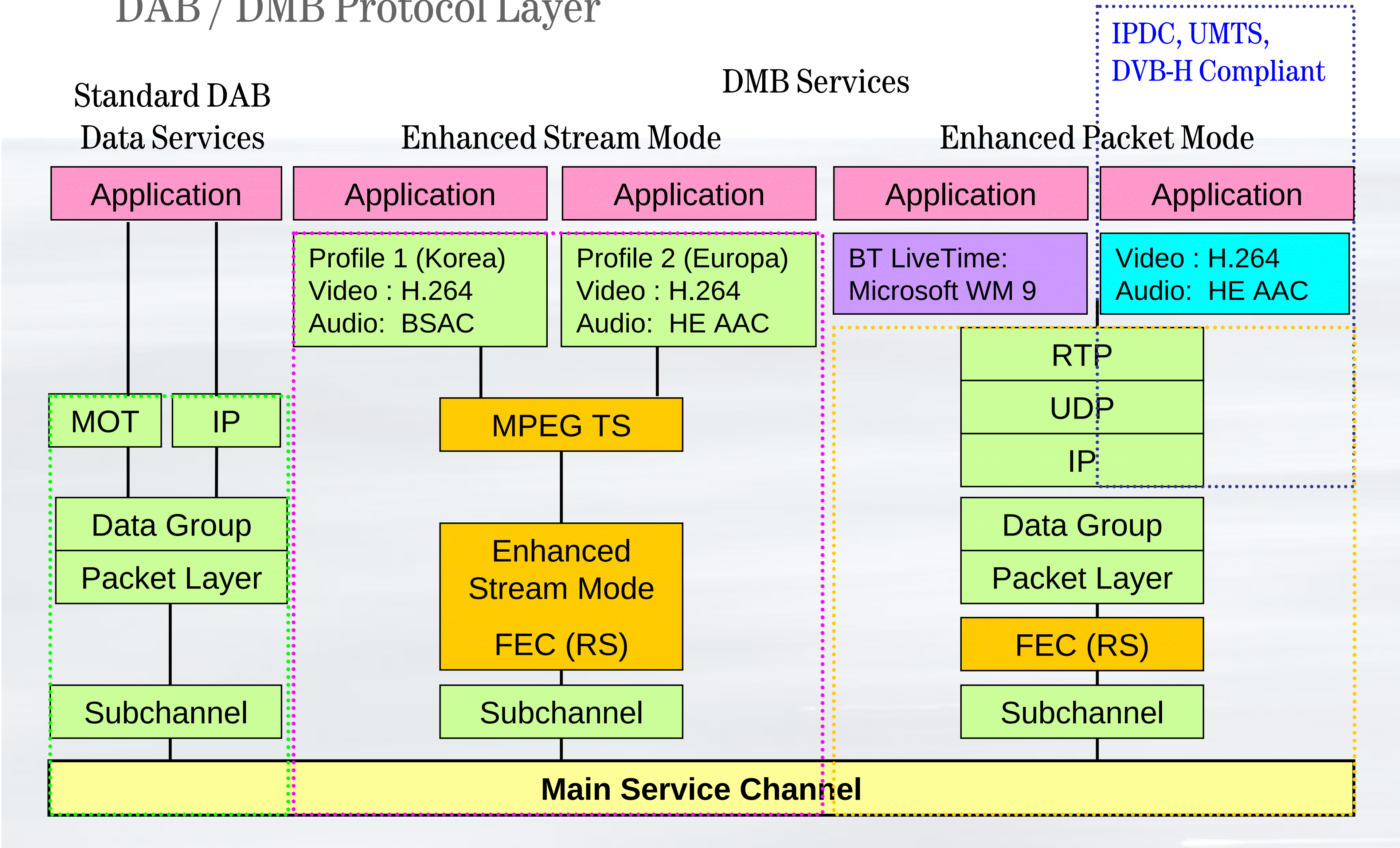
and **DVB-H** is
- a video-focused technology for small and medium, portable device
- in the course of standardisation and testing
- with currently no co-ordinated and allocated spectrum...and an unclear, legally complex business modell.

There is rather more complementation than competition between DMB and DVB-H.

In particular from a European standpoint there is no alternative to DAB/DMB as the dedicated technology for terrestrial distribution of radio in the age of multimedia.

Whatever has been put forward against DAB any alternative technology would have encountered at least the same problems.

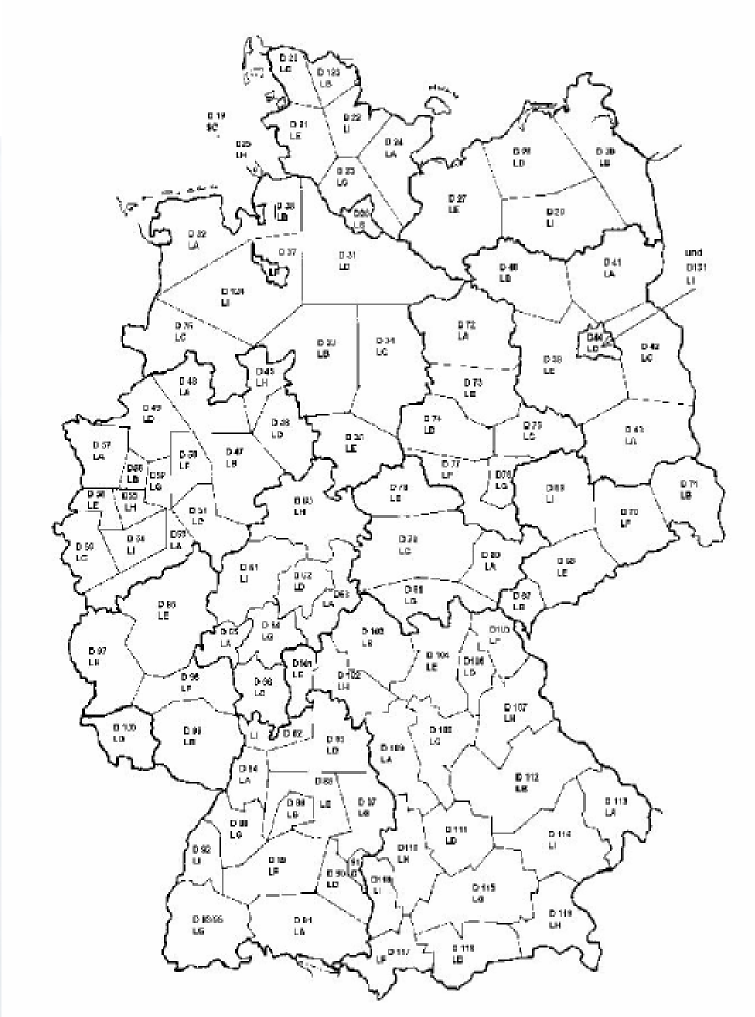
Mobile Broadcast Services
DAB / DMB Protocol Layer



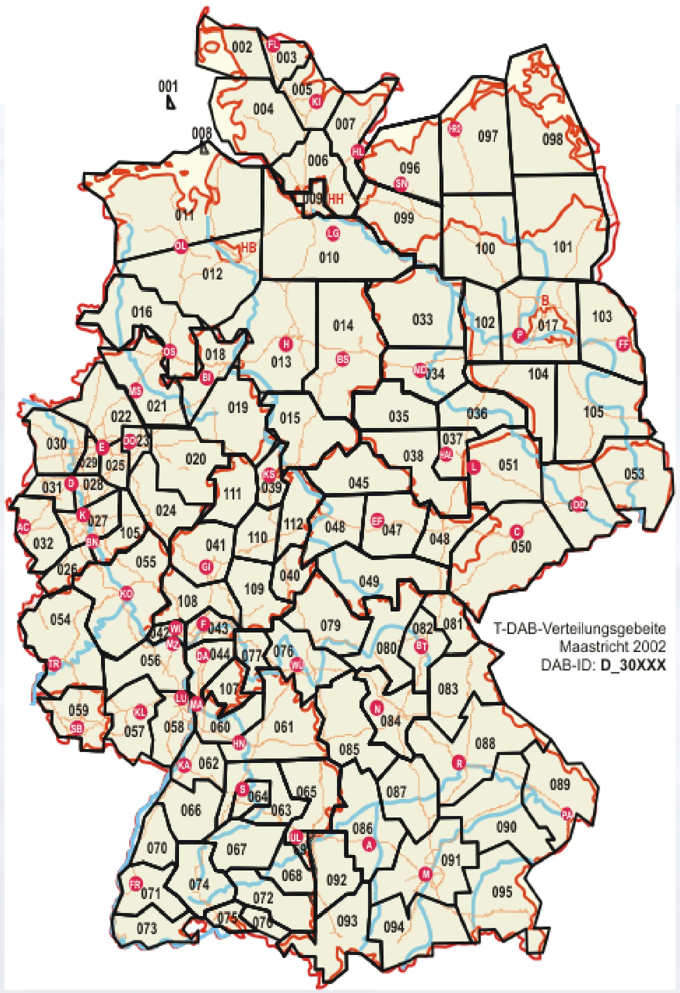
Current aspects driving expectations in Germany

- Growing industry demand for national and state-wide capacity
- Currently no availability of such capacity; Expectation of new VHF capacities with RCC ’06
- DMB as a compatible enrichment of DAB
- Growing diversity of terminals and features
- International Roll-out
- Public radio moving forward
- Automotive Industry is pushing

The L-Band Frequency Range (1452 – 1492 MHz):
An Attractive Frequency Range (especially) for handhelds



1st Nationwide Coverage



2nd Nationwide Coverage

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L-Band:
An Attractive Frequency Range (especially) for Handhelds

The reasons why is L-Band attractive?:

From the handheld's perspective:

- In L-band efficient antennas can be realized even in handhelds
- Antenna diversity makes sense and is an option for further improvement
- L-band has no interference problems with the mobile phone frequency ranges -> integration of different frontends is easier
- Very low man made noise level

From the network perspective:

- Comparably small transmitter antennas
- Due to "limited" bandwidth reasonable transmitter power
- ...and the combined use of broadcast and mobile phone network infrastructure makes sense!

The Necessity of Convergence:
One simple reason!

Revenue per Byte for example services

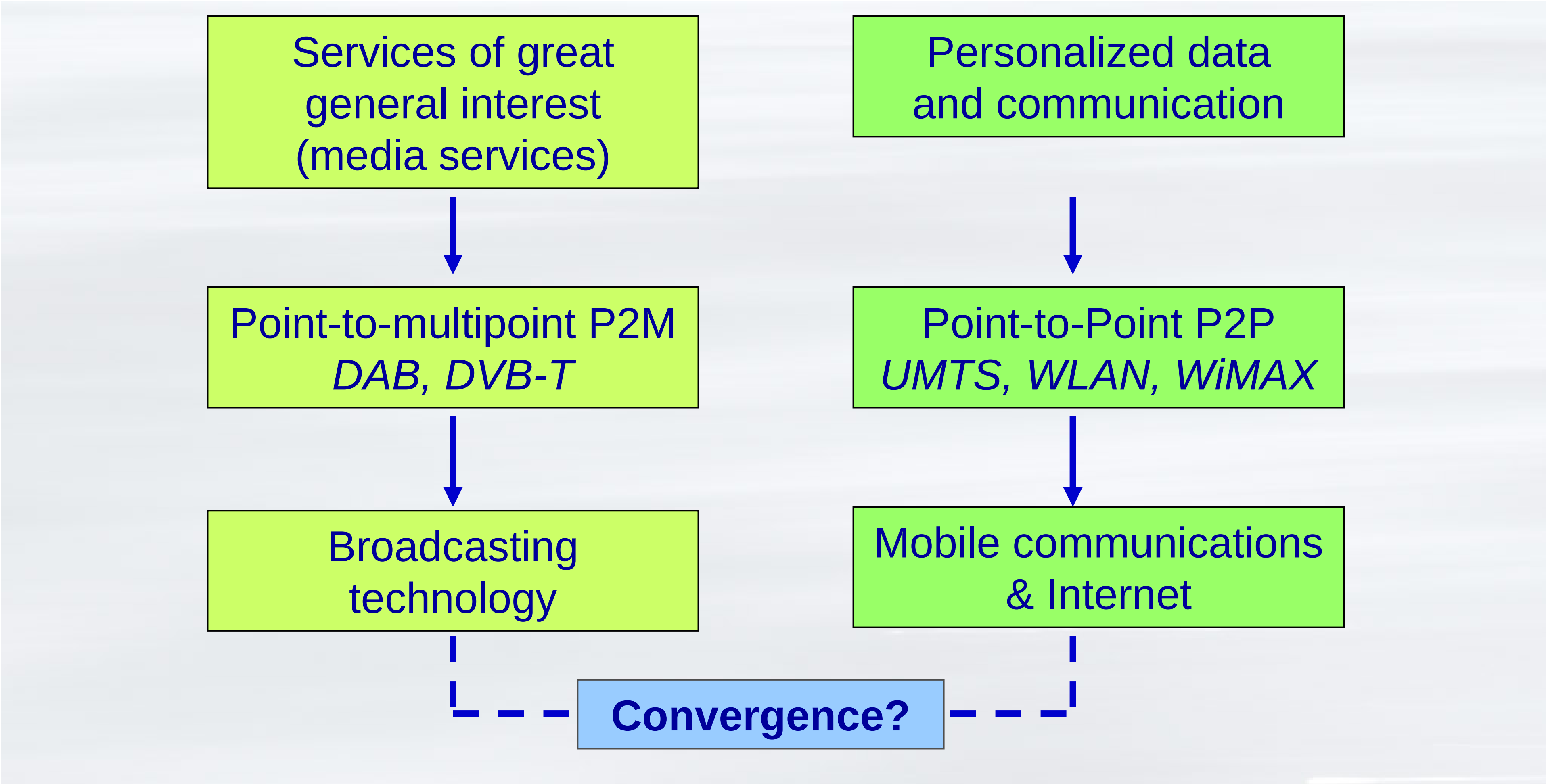
Profitable services

Service	Typical operator revenue	Mbyte consumption	Revenue per Mbyte
SMS message	USD0.15	0.00015Mbyte (160byte)	USD983
Games download	USD3	0.0147Mbyte (15kbyte)	USD205
MMS message	USD0.50	0.00977Mbyte (10kbyte)	USD51.2
1-minute small-screen browsing	USD0.05	0.00488Mbyte (5kbyte)	USD10.2
1-minute voice telephony (peak time)	USD0.25	0.141Mbyte (144kbyte)	USD1.78
1-minute voice telephony (off peak)	USD0.08	0.141Mbyte (144kbyte)	USD0.57
3-minute low-quality (120kbit/s) video clip	USD2	2.637Mbyte	USD0.76
3-minute high-quality (384kbit/s) music video clip	USD3	8.438Mbyte	USD0.36
30-minute low-quality (120kbit/s) video programme (e.g. soap opera)	USD5	26.37Mbyte	USD0.19
90-minute high-quality (384kbit/s) film	USD10	253.1Mbyte	USD0.04

MBMS & HSDPA effects

Source: Analysys Research 2004

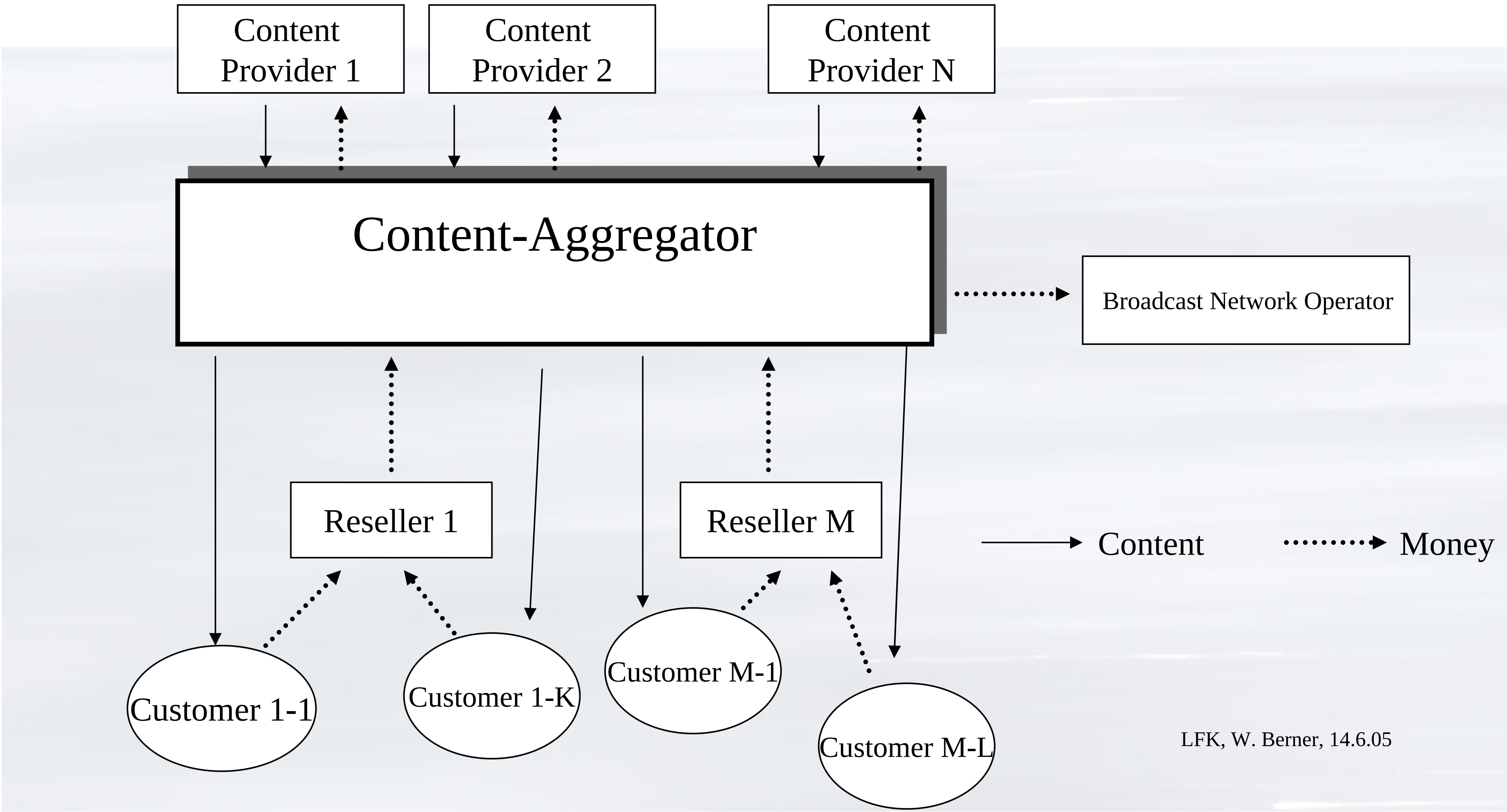
Motivation
Technologies are converging to the benefit of all



The opportunity of a new business model:

- The business will be driven by a subscription fee comparable to the cable network access fee
- The content will be encrypted. It’s mandatory that this option is foreseen by the media regulator!
- Mobile phone companies will be the dominant retail channel
- Subscription fee will finance the content and the transmission costs
- Necessary: Someone aggregating the content

The Business Model:
Subscription based



Flagship Trials

T-Systems offers DMB coverage of 2006 FIFA World Cup™ action in each host city in co-operation with …

Host Venues 2006 FIFA World Cup ™
Germany

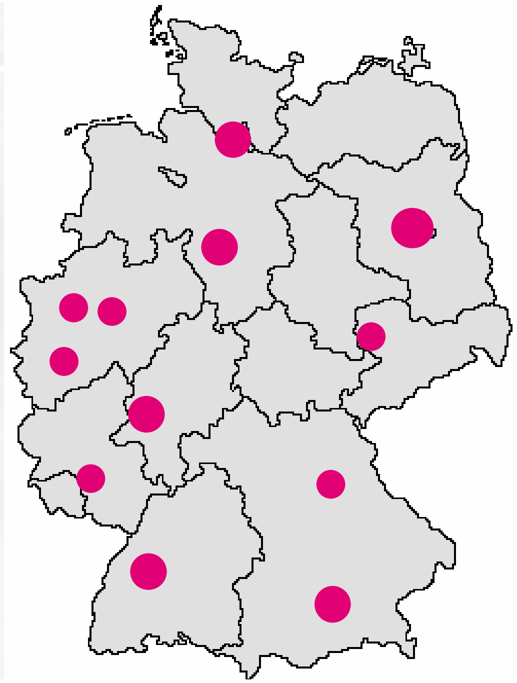
- Service available in each of the twelve host venues where the championship will be taking place
- Local DMB and national HD Radio (DAB) network services
- Fans will be able to receive TV and HD Radio
- licencing process started

FIFA WORLD CUP GERMANY 2006

Official Partner

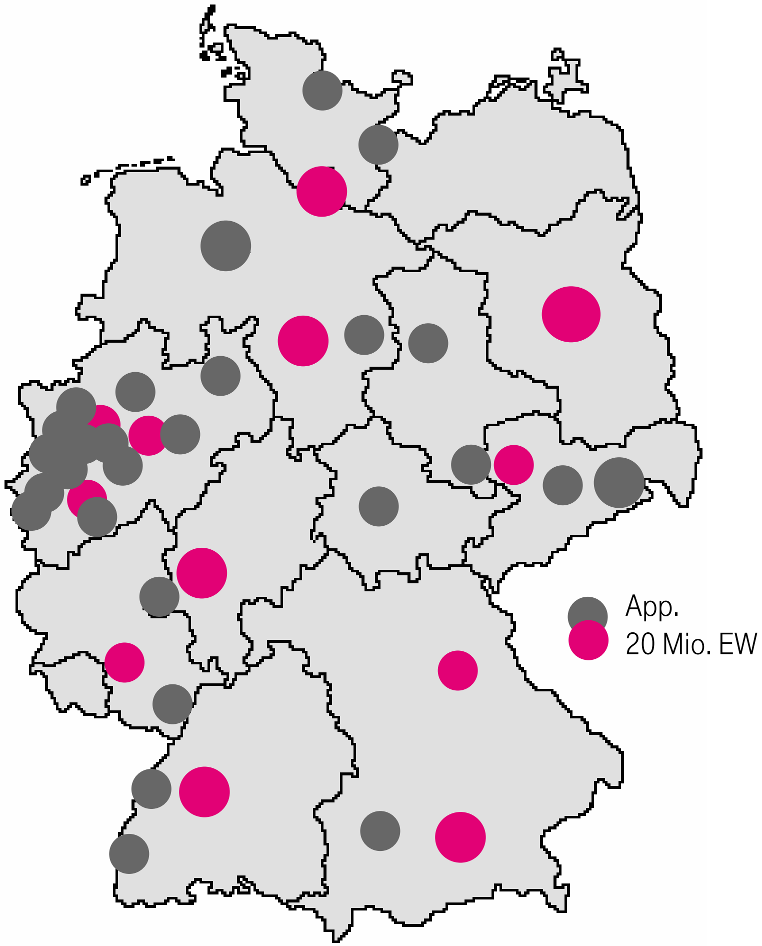
Technical Designs
DMB Rollout WM 2006

City	Trans-mitter	Mobile Outdoor		Portabel Indoor	
		City Area		City Area	
		Inhabitants	Area	Inhabitants	Area
Cologne	2	966.223	401 km²	790.484	290 km²
Dortmund	3	582.462	277 km²	524.958	243 km²
Gelsenkirchen	3	278.100	103 km²	262.028	94 km²
Frankfurt	2	646.199	244 km²	563.464	202 km²
Hamburg	6	1.698.926	735 km²	1.378.689	589 km²
Hannover	2	513.497	204 km²	472.233	164 km²
Berlin	4	3.279.859	868 km²	2.026.556	538 km²
München	1	1.206.938	306 km²	818.057	214 km²
Nürnberg	1	485.332	179 km²	410.135	135 km²
Stuttgart	2	581.059	198 km²	497.006	157 km²
Kaiserslautern	2	96.698	110 km²	85.383	89 km²
Leipzig	3	491.685	298 km²	411.986	246 km²
Sums	31	10.826.978	3.903 km²	8.241.079	2.970 km²
Percent		13,1 %	1,1 %	10 %	0,8 %



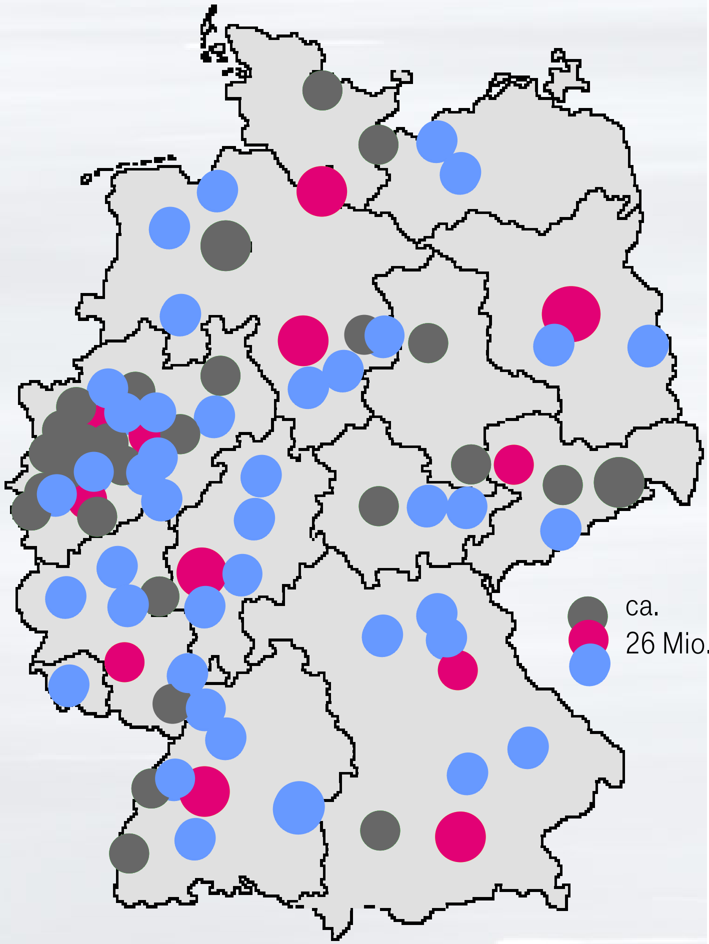
Roll out scenario end of 2006
Cities > 200.000

- Berlin, München, Köln, Dortmund, Gelsenkirchen, Leipzig, Kaiserslautern, Hamburg, Frankfurt, München, Nürnberg, Stuttgart,
- Essen, Düsseldorf, Bremen, Duisburg, Dresden, Bochum, Wuppertal, Bielefeld, Bonn, Mannheim, Karlsruhe, Wiesbaden, Münster, Mönchengladbach, Augsburg, Aachen, Chemnitz, Braunschweig, Halle (Saale), Krefeld, Kiel, Magdeburg, Oberhausen, Lübeck, Freiburg, Erfurt, Hagen,

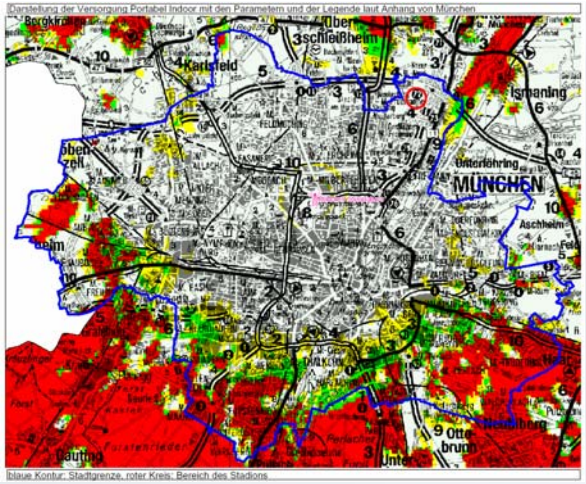


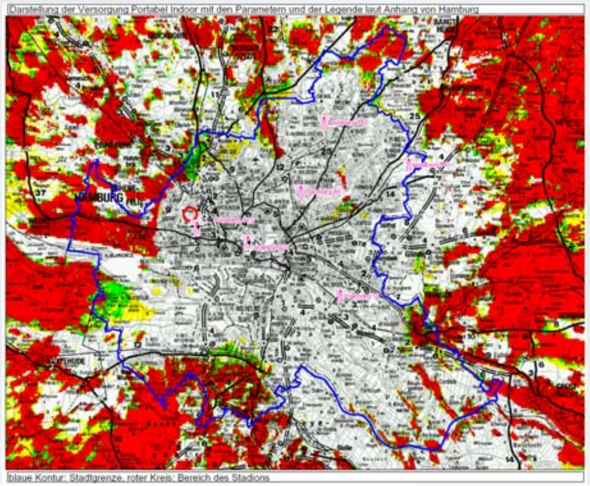
Roll out scenario end of 2007
Cities > 100.000

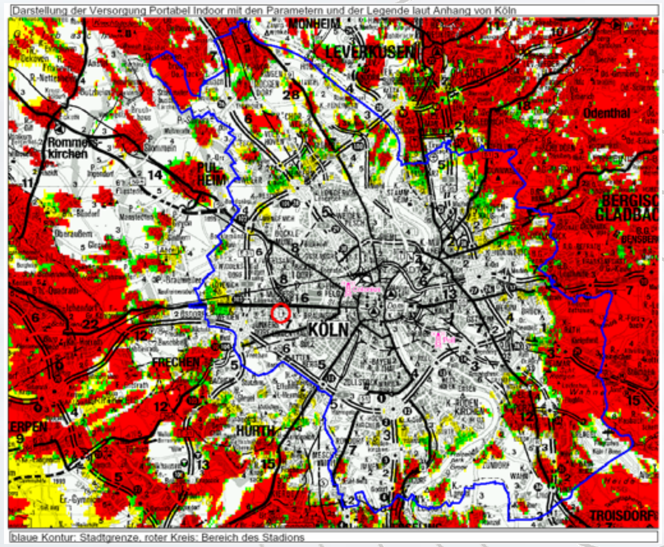
- Berlin, München, Köln, Dortmund, Gelsenkirchen, Leipzig, Kaiserslautern, Hamburg, Frankfurt, München, Nürnberg, Stuttgart,
- Essen, Düsseldorf, Bremen, Duisburg, Dresden, Bochum, Wuppertal, Bielefeld, Bonn, Mannheim, Karlsruhe, Wiesbaden, Münster, Mönchengladbach, Augsburg, Aachen, Chemnitz, Braunschweig, Halle (Saale), Krefeld, Kiel, Magdeburg, Oberhausen, Lübeck, Freiburg, Erfurt, Hagen,
- Rostock, Kassel, Mainz, Hamm, Saarbrücken, Herne, Mühlheim/Ruhr, Osnabrück, Solingen, Ludwigshafen, Leverkusen, Oldenburg, Neuss, Potsdam, Heidelberg, Paderborn, Darmstadt, Würzburg, Regensburg, Recklinghausen, Göttingen, Wolfsburg, Heilbronn, Bottrop, Ulm, Ingolstadt, Offenbach, Pforzheim, Bremerhafen, Remscheid, Reutlingen, Fürth, Salzgitter, Moers, Siegen, Koblenz, Cottbus, Gera, Berg.Gladbach, Hildesheim, Jena, Erlangen, Witten, Trier, Zwickau, Schwerin.



Coverage Prediction:
Some examples (white area: portable indoor)







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Time has come for commitment in the German market !

Antenna-Diversity:
An attractive Option!