



Mobile Broadcast and Mobile Broadband

The Frequency Issue

Technical & Regulatory Aspects

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IRT Frequency Management



Overview

Overview

- **The Frequency Issue**
- **Spectrum for Mobile Broadcast and Mobile Broadband**
- **The Terrestrial Broadcast Situation**
- **Digital Dividend: The UHF Case**
- **Conclusions**



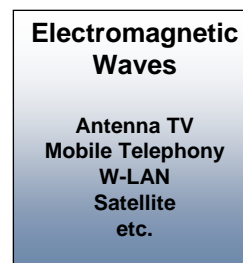
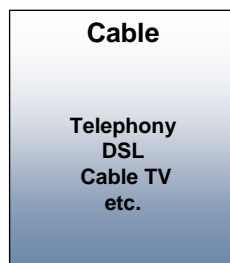
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Why Frequencies?

Why are frequencies needed for Mobile Broadcast/Mobile Broadband?

Transport of information

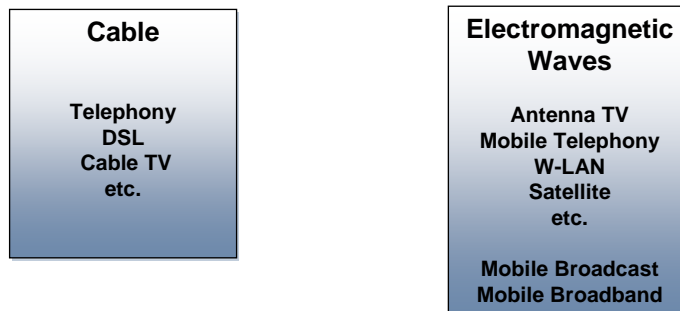




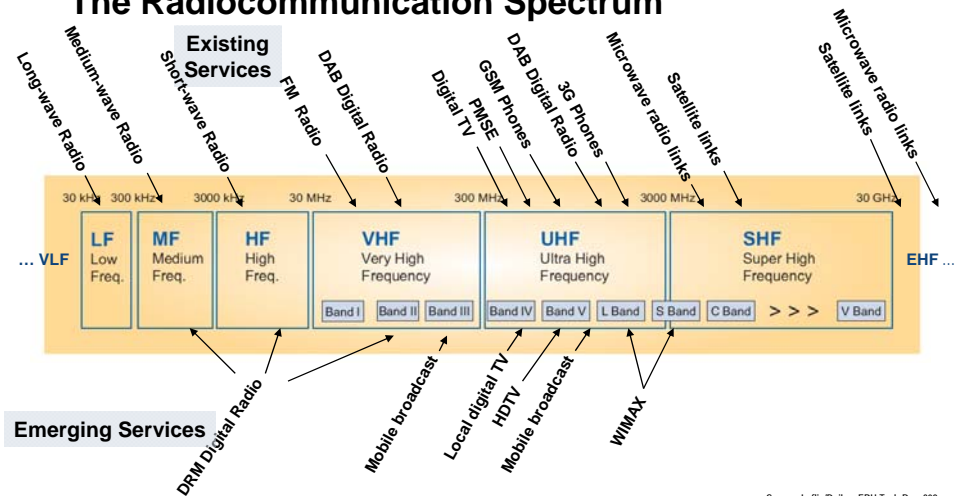
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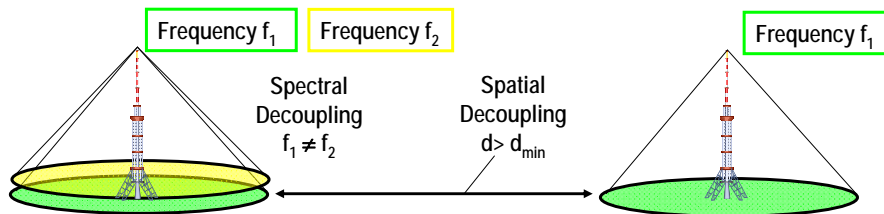
The Radiocommunication Spectrum



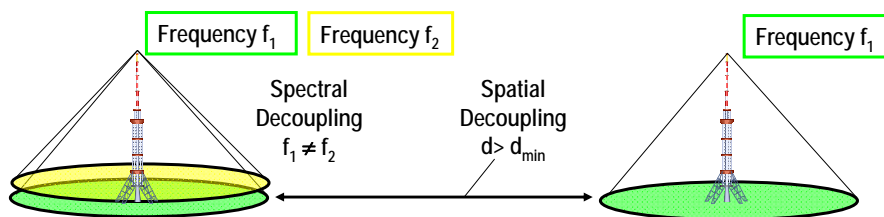
Source: Laffin/Dajka - EBU Tech.Rev. 309



Planning of Frequencies



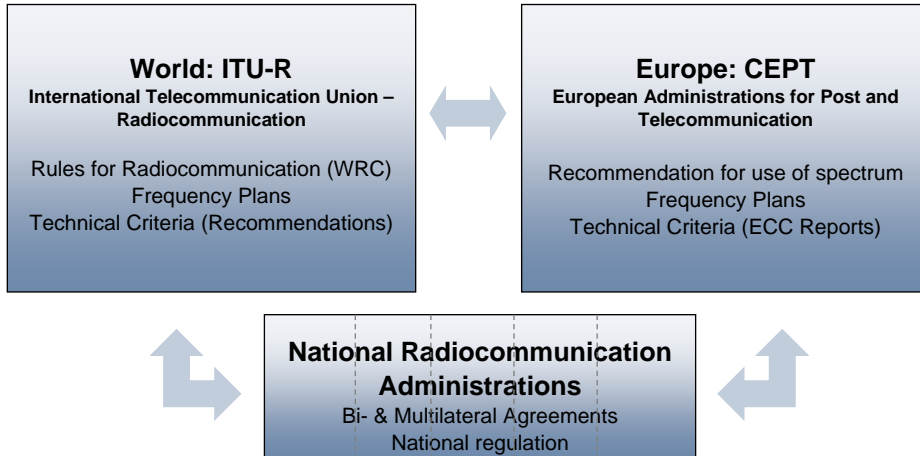
Planning of Frequencies



- For proper use of spectrum
 - Spectral and/or spatial decoupling
 - (also temporal or code decoupling for non-broadcast services)

- No restriction to national borders

Regulatory Bodies

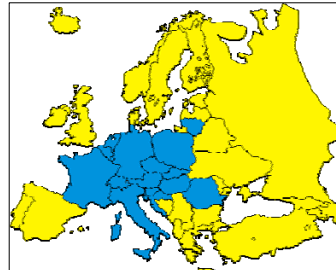


Examples of Frequency Plan/Co-ordination Agreements

**GE06 Agreement
(ITU-R: Geneva 2006)**
Digital Broadcasting in
Band III (174 – 230 MHz) and
Band IV/V (470 – 862 MHz)



**HCM Agreement (Vilnius 2005)
(Multilateral)**
Fixed and Land Mobile Services
between 29.7 MHz and 39.5 GHz



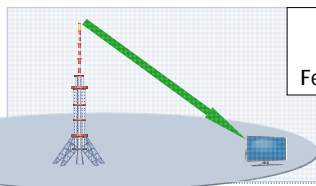
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Characteristics of Services

One-to-Area/One-to-Many (transmitter -> receiver)

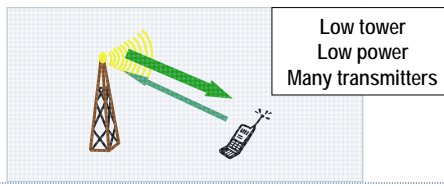
Broadcast (Radio, TV)
Information services (e.g., radio clock)
Mobile Broadcast



High tower
High power
Few transmitters

One-to-One (transmitter/receiver <-> receiver/transmitter)

Mobile Telephony
Mobile Broadband (e.g., internet access)



Low tower
Low power
Many transmitters

Characteristics of Frequency Bands

Lower frequencies reach longer than higher frequencies

electro-magnetic propagation properties in the radiocommunication spectrum

Lower frequencies penetrate better into buildings than higher frequencies

Absorption properties of electro-magnetic waves

Lower frequencies have lower data capacity than higher frequencies

For technological and processing reasons

Example: DVB-T Broadcast Service in Bavaria

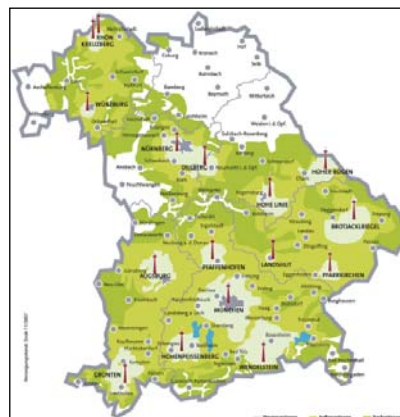
Broadcast Network

Full area coverage (in 2008)
Mostly portable/mobile coverage
Indoor coverage in main cities

Frequency: 600 MHz

Sparse transmitter density:

20 transmitters for 300 x 400 km



Example: Mobile Service Network in Greater London

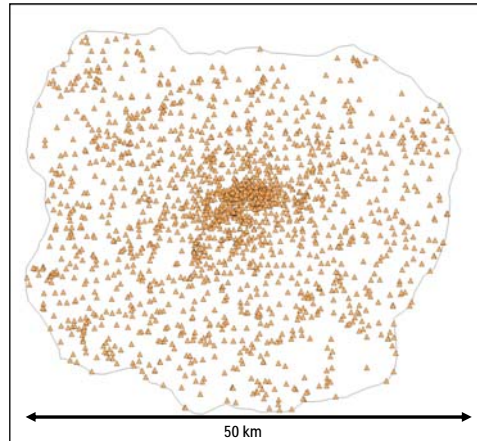
Cellular Network:

Typical cell site distribution
Inside Motorway M25 (London)

Frequency: 1800 MHz

High Transmitter Density:

about 2000 sites



Source: EBU BPN on Network Aspects
for DVB-H & T-DMB (tbp)

Characteristics of Frequency Bands

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Comparison:

Increase of transmitter sites when moved to higher frequencies

Broadcast service network
10 – 15 times more

Mobile service network
2 – 4 times more

Possible Spectrum (in Europe)

Mobile Broadcast

Broadcast Spectrum:

Band III (174 -230 MHz)	Analogue TV DAB, DVB-T
Band IV/V (470 – 862 MHz)	Analogue TV DVB-T
L-Band (1452 – 1490 MHz)	unused / DAB

Band II (FM-Radio) and lower
not appropriate for Mobile Broadcast

Analogue TV switched off by 2012 in EU

Mobile Broadband

GSM/UMTS Spectrum:

880 – 960 / 1710 – 1780 MHz	GSM
1920 – 1980 / 2110 -2170 MHz	UMTS partly unused
1900 – 1920 / 2010 – 2025 MHz	UMTS unused
2500 – 2585 / 2605 – 2690 MHz	UMTS LTE

General Mobile Broadband Spectrum:

450 – 470 / 790 – 862 MHz	IMT (WRC-07)
3400 – 3800 MHz	IMT & other
2300 – 2400 MHz	(WRC-07)

IMT: Family of Mobile Service Technologies (UMTS, WIMAX, ...)



Summary on characteristics and availability of spectrum

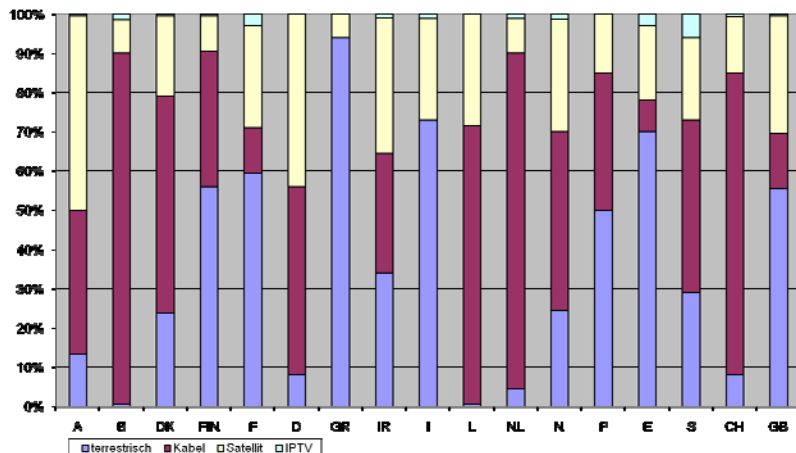
- Spectrum for Mobile Broadcast and Mobile Broadband is available
- Lower frequencies more appropriate for One-to-Area/Many services
- Higher frequencies more appropriate for One-to-One services
- Terrestrial Broadcasting hardly possible (for economic reasons)
in high frequency bands



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Broadcast Platforms in Europe



Terrestrial Broadcast Platform in Europe

Very heterogeneous use for 'main TV set in household' across Europe

Group A

High degree of terrestrial-only households (> 60%)

Greece
Italy
Spain
Czech Republic
France

Group B

Mixed platforms 25% - 50% households terrestrial-only

UK
Poland
Finland
Denmark
Norway
Hungary
Ireland
Sweden

Group C

Pre-dominance of cable and/or satellite platform (< 10% terrestrial)

Austria
Switzerland
Germany
Netherlands
Belgium

Terrestrial Broadcasting - Scale of Service Area

Large scale of extension of service areas

National

Typical extension: several 100 km

National Radio
National TV

Regional

Typical extension: up to 100 km

Regional Radio
Regional TV

Metropolitan
Radio & TV

Local

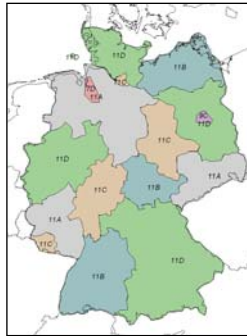
Typical extension: 5 – 20 km

Metropolitan
Radio & TV

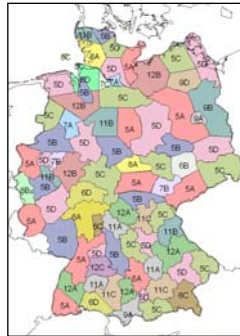
Local Radio
(Local TV)

Example: T-DAB Service Areas in Germany Different Structure of Service Areas in Parallel

Regional Structure
(German Bundesländer)



Sub-regional/Local Structure



Terrestrial Broadcasting – Variety of Programme Content

Large differences in variety of programme content from country to country
Increase of variety of service type

**Small Variety
of Programme
Content**

4 – 10
programmes
(1 – 3 MUX)

Austria
Switzerland

**Large Variety
of Programme
Content**

20 – 30+
programmes
(6+ MUX)

Italy
France
Germany

**Type of
Broadcast
Service**

“Classical” TV

High Definition TV
Mobile TV

Summary on Situation of Terrestrial Broadcasting

- **Heterogeneous structure in Europe with regard to**
 - Role of terrestrial platform
 - Scale of service areas
 - Variety of programme content
 - Different plans for service types

- **In several/many countries additional need for terrestrial spectrum**
 - Increase of programme variety
 - HDTV
 - Mobile broadcast

- **Regulation on national and/or regional basis required**

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Digital Dividend

Spectrum Dividend: EC-COM on RRC-06 (Sep 2005)

The spectrum dividend is understood as the spectrum made available over and above that required to accommodate the existing services in a new, more efficient form by applying new transmission and coding techniques

Digital Dividend of RRC-06

Transition from Analogue TV to DTTV (DVB-T), finished by 2015 (EU: 2012)

Analogue TV Plan (ST61):
3 - 6 nationwide coverage layers



Can be accommodated in 1 - 2 DVB-T MUX:
7 - 14 channels in new Digital Plan (GE06)

According to EU definition: 75 - 80% dividend

UHF spectrum 470 - 862 MHz (Broadcast band of GE06 Plan)	
20 - 25%	75 - 80%
Broadcast Services	Digital Dividend

Digital Dividend – A realistic view

- Transfer of „Stockholm 1961“ to today's digital world is anachronistic
- Terrestrial broadcasting has to be competitive
- Digitalisation allows for
 - broadcast content diversity
 - broadcast service type diversity
- Broadcast spectrum is needed
- Broadcasters have already invested hundreds of million Euros to go for that objective

WRC-07 and EC-COM (Nov 2007) on Digital Dividend

EC Communication on Digital Dividend (Nov 2007)

UHF spectrum 470 – 862 MHz (Broadcast band of GE06 Plan)		
„Classical“ Broadcast Services	Mobile Broadcast Services	Mobile Services (IMT)

ITU World Radiocommunication Conference 2007 (WRC-07)

UHF spectrum 470 – 862 MHz (Broadcast band of GE06 Plan)	
40 channels	9 channels
Broadcast Services	Co-Primary Mobile Services (IMT)

Impact on Broadcast Services

Loss of existing broadcast services

Example Germany:

loss of one broadcast layer
damage of further two broadcast layers

Example Spain:

loss of three broadcast layers

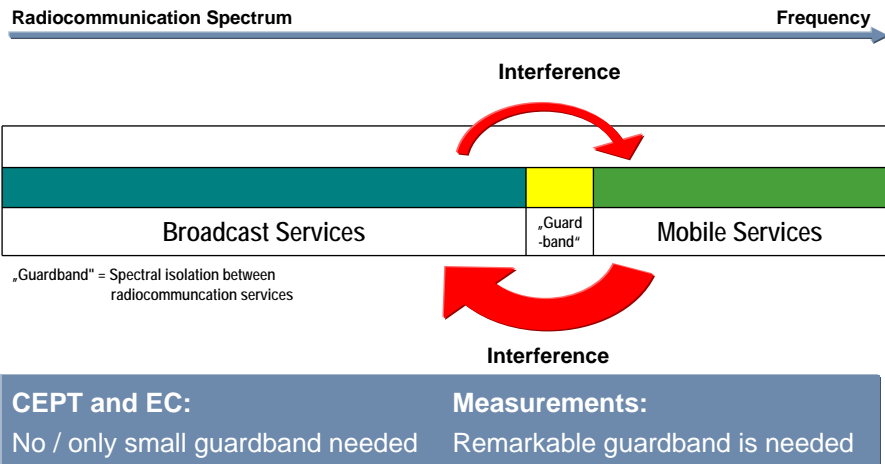
Restrictions for development of novel broadcast services

HDTV
Mobile Broadcast

Violation of „Equitable Access“ to the radiocommunication spectrum

Percentage loss of broadcast coverage
SWE: 5,9%, F: 12,2%, D: 16,6%, BEL: 22,0%

Co-existence of services in adjacent frequency bands



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Conclusions

- **Spectrum for Mobile Broadcast and Mobile Broadband available**
- **Spectrum situation across Europe not unique**
 - Structure of Broadcast Services is complex and heterogeneous
-> Planning and regulation on national/regional level required
- **Use of frequency bands**
 - Lower bands more appropriate for One-to-Area/One-to-Many services
 - Higher bands more appropriate for One-to-One services
- **Digital Dividend in the UHF band**
 - With restrictions in the UHF band broadcasters in several/many European countries loose
 - already existing broadcasting services
 - room for future development
 - Co-existence criteria for Broadcast and Mobile Services not satisfactory

Thank you for your attention

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