

# 800 MHz Auctions and Implementation of the DD in Germany

Roland Brugger (IRT) & Oliver Kluth (WDR)

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# Overview

- 1. Political Process**
- 2. Allocation**
- 3. Auction Result**
- 4. LTE Network Implementation**
- 5. Future of PMSE**
- 6. Broadcasters' View**

# 1. Political Process (1)

- **November 2007 : Co-primary allocation of the 800 MHz band to the broadcasting service and IMT (WRC-07)**
- **February 2009 : Adoption of the federal government broadband strategy (government)**
  - Designation of the 800 MHz band for broadband access
  - Broadcasting to be phased out
- **March 2009 : Regulation for the change of the national frequency allocation table (Bundesnetzagentur)**
  - 800 MHz band for mobile broadband access, preferentially to bridge the digital divide in rural areas
  - The use of the 800 MHz band for mobile broadband must not lead to interference with the broadcasting service

# 1. Political Process (2)

- **June 2009 : Adoption of the above regulation by the Federal Council of Germany together with the following expectations towards the government (Federal Council)**
  - Regulation is only first step towards use of the DD for broadband. Further steps need intensive involvement of the Federal States.
  - To use the auction revenue for DD migration cost
  - To compensate the Federal States and municipalities for the PMSE migration cost
  - To solve interference issues before allocation and use of the DD
  - To bindingly allocate adequate replacement spectrum for PMSE users before the auction
  - To bridge the Digital Divide uniformly in all Federal States
  - To consult in all of the above issues with the Federal States.
- **October 2009 : Announcement of the allocation conditions in the administration's official gazette (Bundesnetzagentur)**

## 2. Allocation

- **General setup**
- **Accredited bidders**
- **Spectrum auctioned**
- **Licensing conditions**

## General Setup

- Allocation of the DD spectrum together with spectrum in several other frequency bands
- Method of allocation : auction (in rounds)
- Bidders had to apply for admission
- Bids for the 800 MHz band were restricted to 20 Mhz paired (900 MHz GSM spectrum was credited)
- Concrete and abstract frequency blocks

## Accredited Bidders (out of 6)

- E-Plus
- Telefónica O2 Germany
- Telekom Deutschland
- Vodafone D2

The logo for e-plus+ is written in a green, lowercase, sans-serif font. The plus sign is a simple cross.The logo for O2 consists of a large, blue, serif letter 'O' with a smaller '2' as a subscript to its right.

*A Telefonica company*

The logo for T-Mobile features a white 'T' inside a red square, followed by the word 'Mobile' in a white, serif font, all set against a red rectangular background with white dots on either side.The Vodafone logo consists of a red speech mark inside a white circle, with the word 'vodafone' in a red, lowercase, sans-serif font below it.

## Spectrum Auctioned

Frequency Band (GHz)	Paired (Y/N)	Blocks	Amount (MHz)
<b>0.8</b>	<b>Y</b>	<b>6 x (2 x 5 MHz)</b>	<b>60</b>
<b>1.8</b>	<b>Y</b>	<b>5 x (2 x 5 MHz)</b>	<b>50</b>
<b>2.0</b>	<b>Y</b>	<b>4 x (2 x 4.95 MHz)</b>	<b>39.6</b>
<b>2.0</b>	<b>N</b>	<b>14.2 MHz + 5 MHz</b>	<b>19.2</b>
<b>2.6</b>	<b>Y</b>	<b>14 x (2 x 5 MHz)</b>	<b>140</b>
<b>2.6</b>	<b>N</b>	<b>10 x 5 MHz</b>	<b>50</b>

**overall**

**358.8 MHz**



## Licensing Conditions (All Bands)

- **Expiration date 31 December 2025 (~15y)**
- **Licensing conditions may be changed in the future to safeguard efficient and interference-free use, or to comply with international harmonization**
- **Separate conditions for 800 MHz band**
- **Conditions for 800 MHz band are expected to change (European and national decisions pending)**

## Licensing Conditions (800 MHz Band)

- **Based on ECC/DEC/(09)EE, CEPT reports 30 and 31 (not finalised at that time)**
- **Protection concept entirely based on BEMs (report 30)**
- **Base station max in block EIRP:**
  - 64 dBm rural (5 MHz),
  - 56 dBm urban (5 MHz),
  - higher in „certain“ cases
  - Concrete EIRP values for BS with regard to the protection of broadcasting
- **FDD Mode, Frequency arrangement like preferred from CEPT report 31 (1 MHz guard band)**

# Frequency Arrangement

790-791	791-796	796-801	801-806	806-811	811-816	816-821	821- 832	832-837	837-842	842-847	847-852	852-857	857-862
Guard band	Downlink						Duplex gap	Uplink					
1 MHz	30 MHz (6 blocks of 5 MHz)						11 MHz	30 MHz (6 blocks of 5 MHz)					

## Licensing Conditions (800 MHz Band)

- **Max. BS EIRP below 790 MHz:**
  - max. 0 dBm, where ch60 is in use
  - 22 dBm, where ch 60 not in use (+ no restriction on in block EIRP)
- **Max. in block terminal EIRP approx. 25 dBm, higher if directional antennas are used**
- **Determination of concrete BS parameters with regard to protection of other frequency users, especially broadcasting**

# Coverage Obligations all Bands

Population coverage whole country

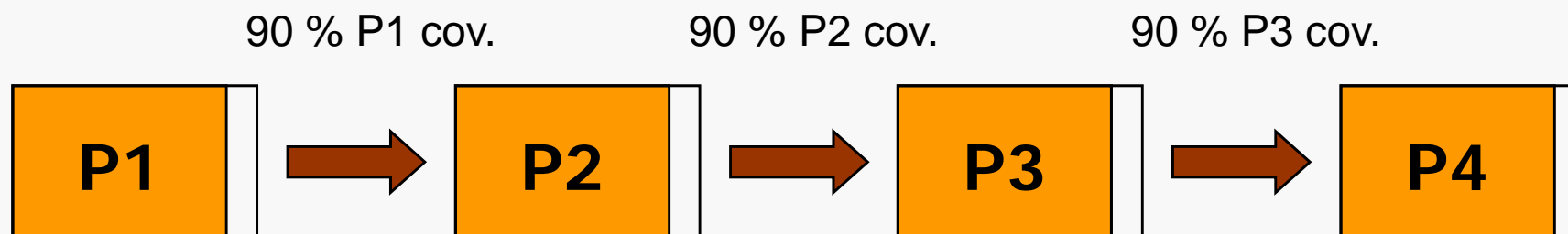


Jan 1 2014    Jan 1 2016

## Additional Coverage Obligations 800 MHz Band

- List of cities / municipalities per federal state
- 4 priority classes
- Staged coverage obligations

Priority	Inhabitants
P1	< 5k
P2	5k-20k
P3	20k-50k
P4	>50k



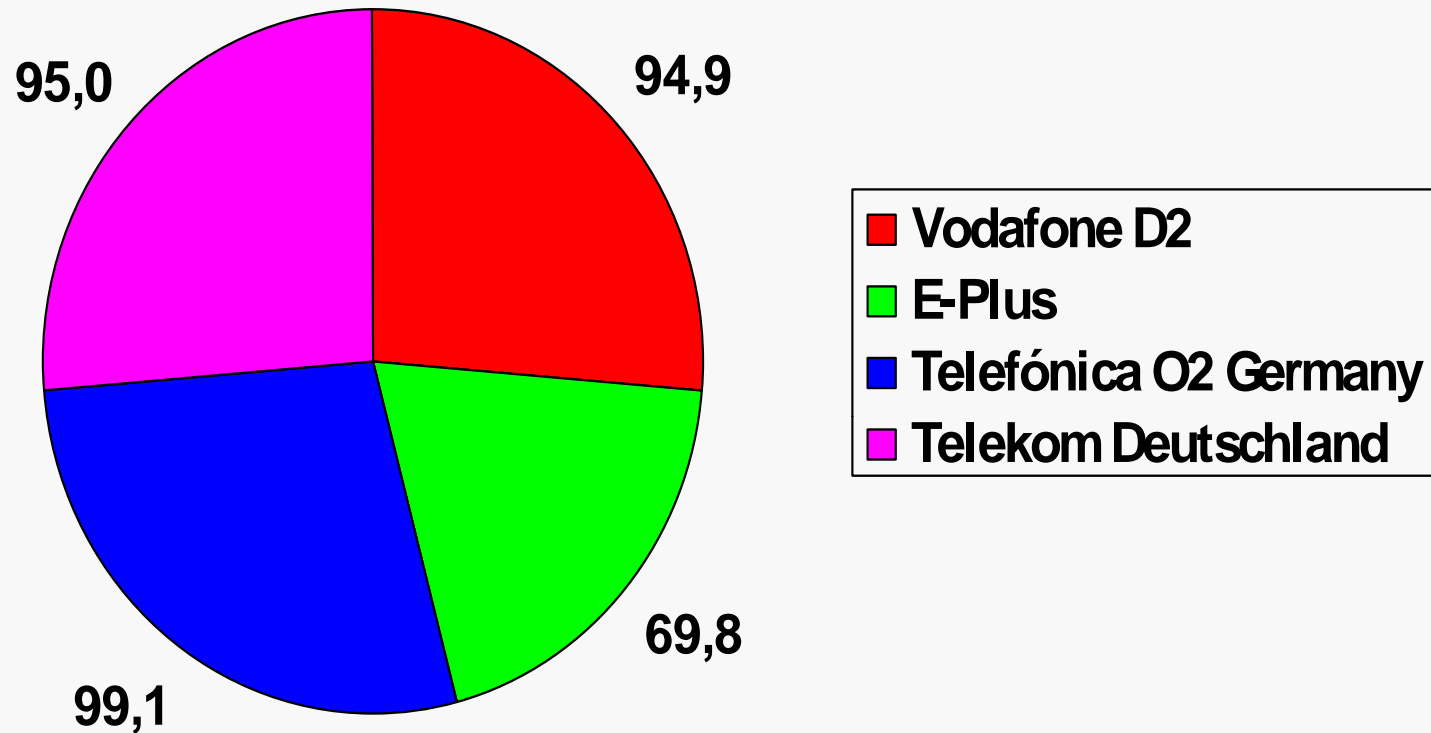
**Other technologies and providers  
are credited !**

**1.1.2016**

## 3. Auction Result : Overview

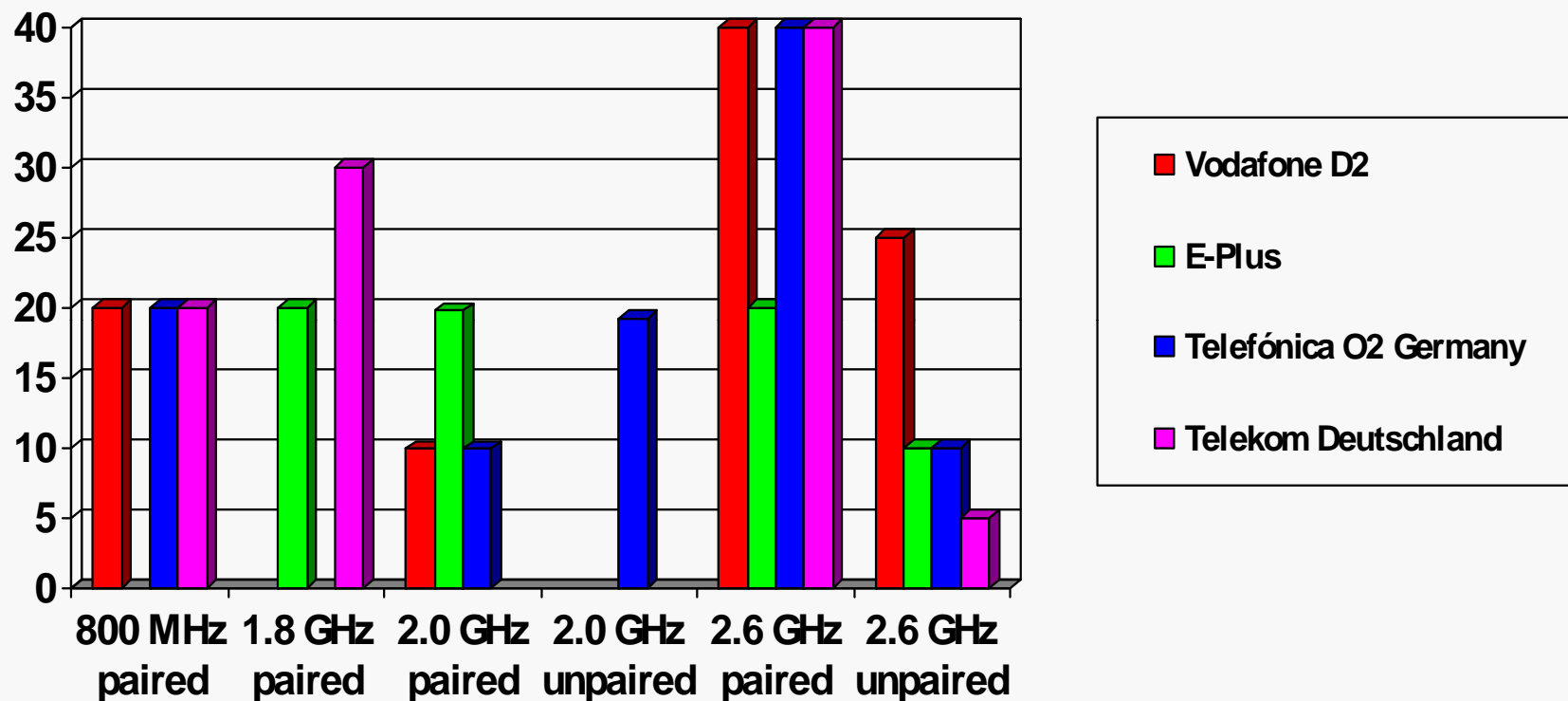
- **All spectrum auctioned (258,8 MHz)**
- **27 days (April 12 - May 20, 2010)**
- **224 rounds**
- **Revenue : 4.38 billion €**
  - 800 MHz band :  
3.57 billion € ( 81.5% for 60 MHz spectrum )
  - Other bands :  
0.81 billion € ( 18,5% for 298,8 MHz spectrum )

## Spectrum Acquired (MHz)

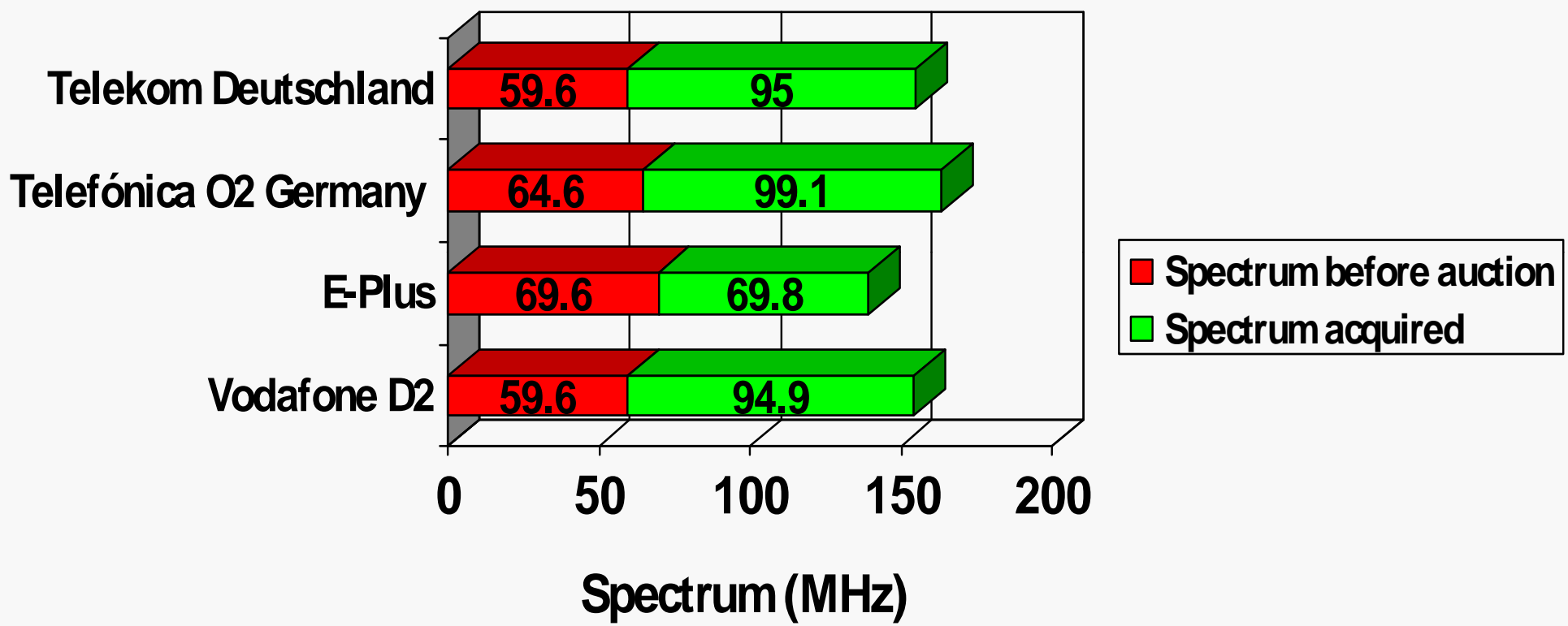




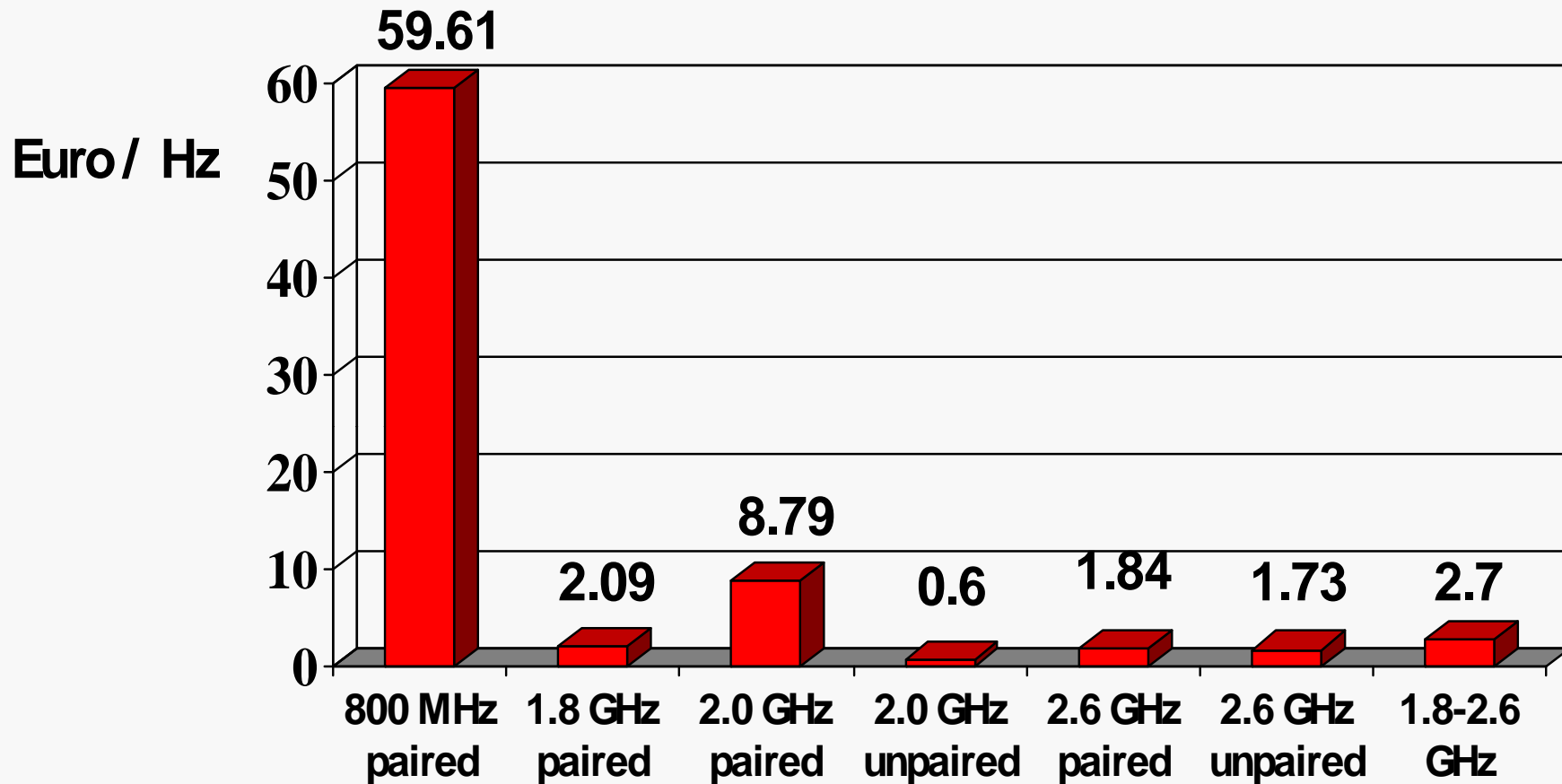
## Spectrum acquired per band



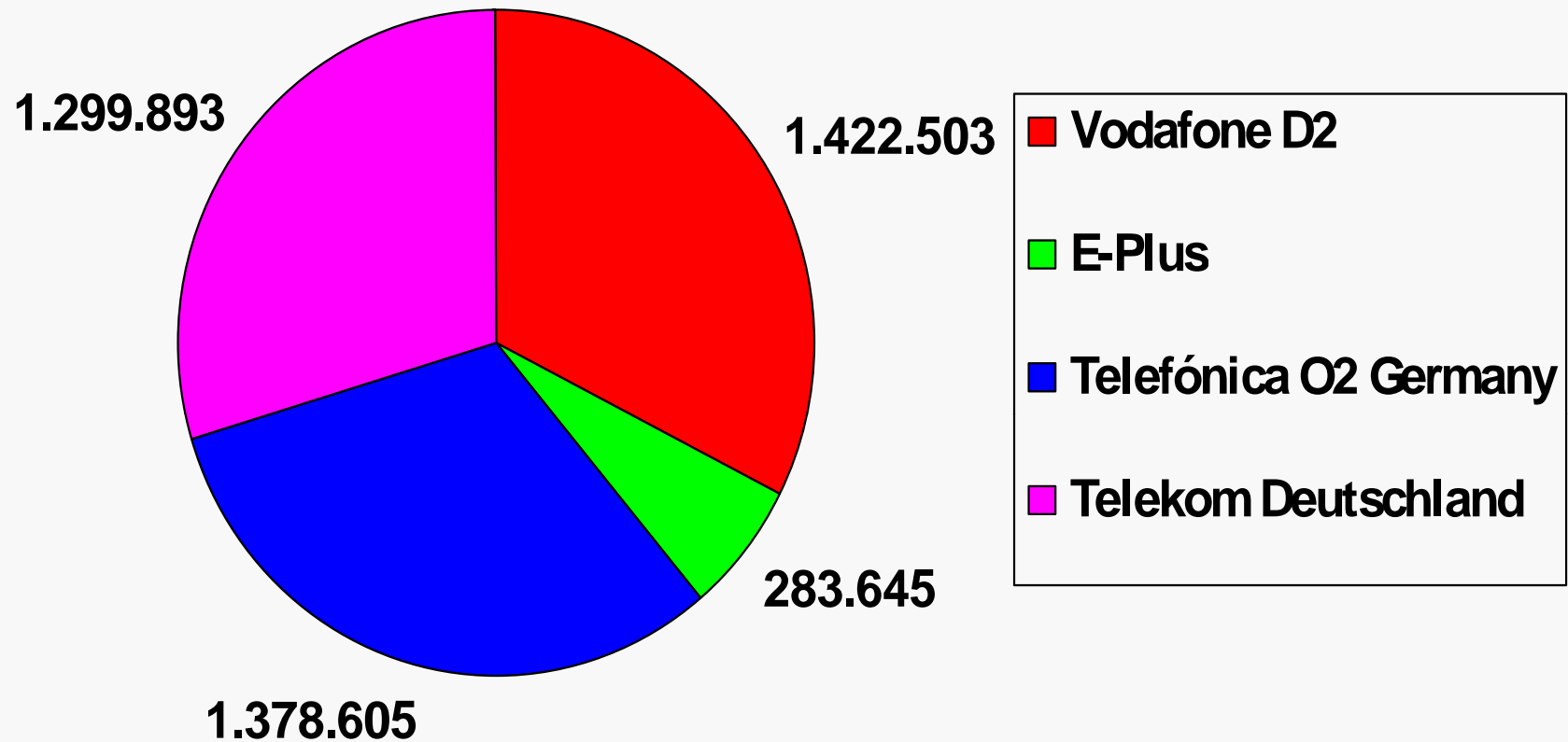
# Spectrum per Operator



## Price per Hz



## Sum of Bids (T€)



## 4. LTE Network Implementation

- Vodafone D2:
  - 1500 LTE Base stations until March 2011
  - All GSM base stations to be equipped with LTE within the next 3 years
  - 5 MBit/s rural, up to 70 MBit/s in the cities
- Telekom Deutschland:
  - 500 LTE Base stations until end of 2010

## 5. Future of PMSE

- **Frequency situation in bands IV/V before WRC-07**
  - Channels below 60 used by public broadcasters almost exclusively for PMSE (spectrum scarcity for big events due to digital switchover)
  - 600.000-700.000 license exempt PMSE devices operated in channels above 60 (ch61-63,ch67-69)
- **New frequency situation**
  - Broadcasters to use channels 21-50
  - Channels 51 to 60 to be used by other professional users
- **Replacement spectrum envisaged at the moment**
  - Duplex gap of the 800 MHz band
  - L-band

## 6. Broadcasters' View

### Licensing Conditions (800 MHz Band)

- No protection criteria defined for broadcasting before beginning of operation (except BS parameters)
- No concrete proceeding to deal with possible interferences
- No protection beyond CEPT report 30
- No mitigation techniques (reference to report 30)
- No provisions for the protection of portable DVB-T reception (reference to report 30)
- No protection ratios (LTE-> DVB-T) for the assessment of compatibility

**=> legal action pending**

## Cost Compensation

- **Cost compensation for PMSE users insufficient**
- **Cost compensation for DVB-T operators insufficient**



# Thank you for your attention

**Roland Brugger (IRT)**  
**brugger@irt.de**

**Oliver Kluth (WDR)**  
**oliver.kluth@wdr.de**