Regulatory Aspects of Broadband Wireless Access

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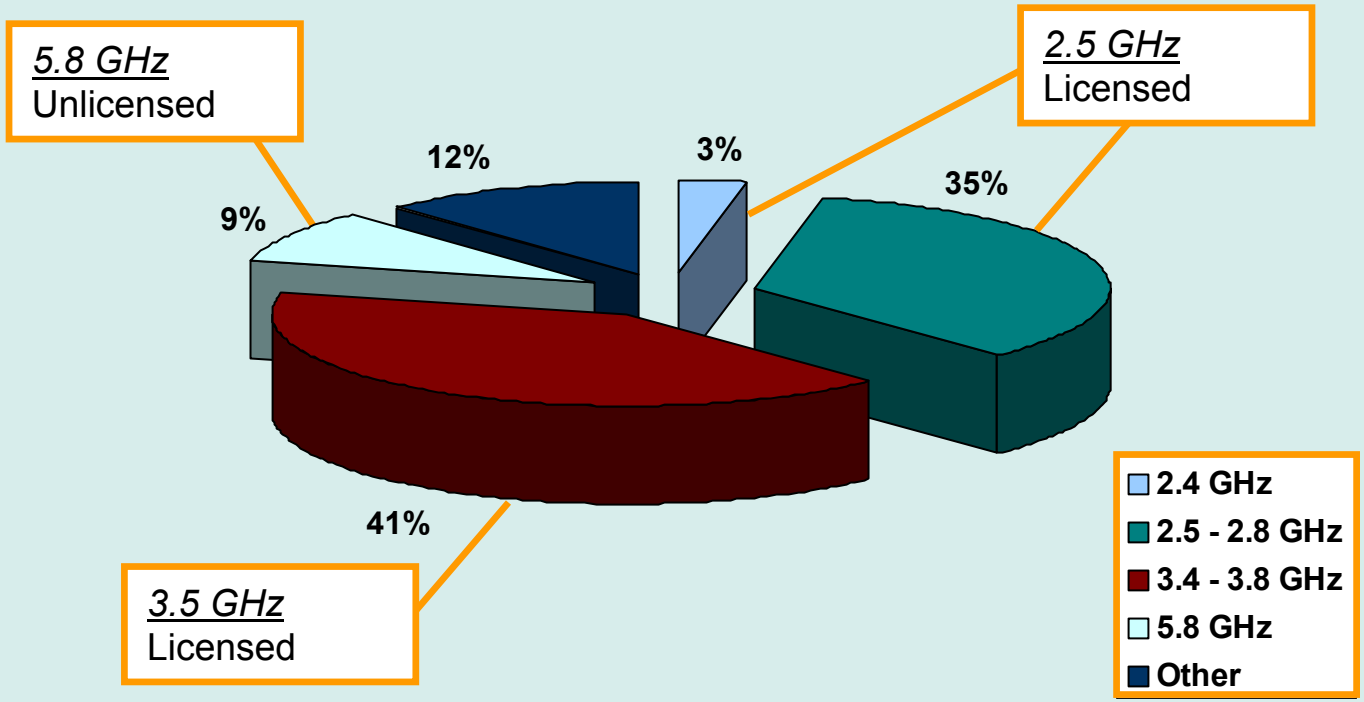
Outline

- Spectrum
  - BWA frequency bands
  - current CEPT regulations
  - EU policies for BWA
- Licensed versus unlicensed spectrum
- BWA spectrum assignments across Europe
  - historical background
  - overview of practical aspects
- Country cases

Spectrum - BWA frequency bands

Source: WiMAX Forum

Spectrum – BWA frequency mix



Source: Skylight Research, Forecast for 2006

Spectrum - Current CEPT regulations

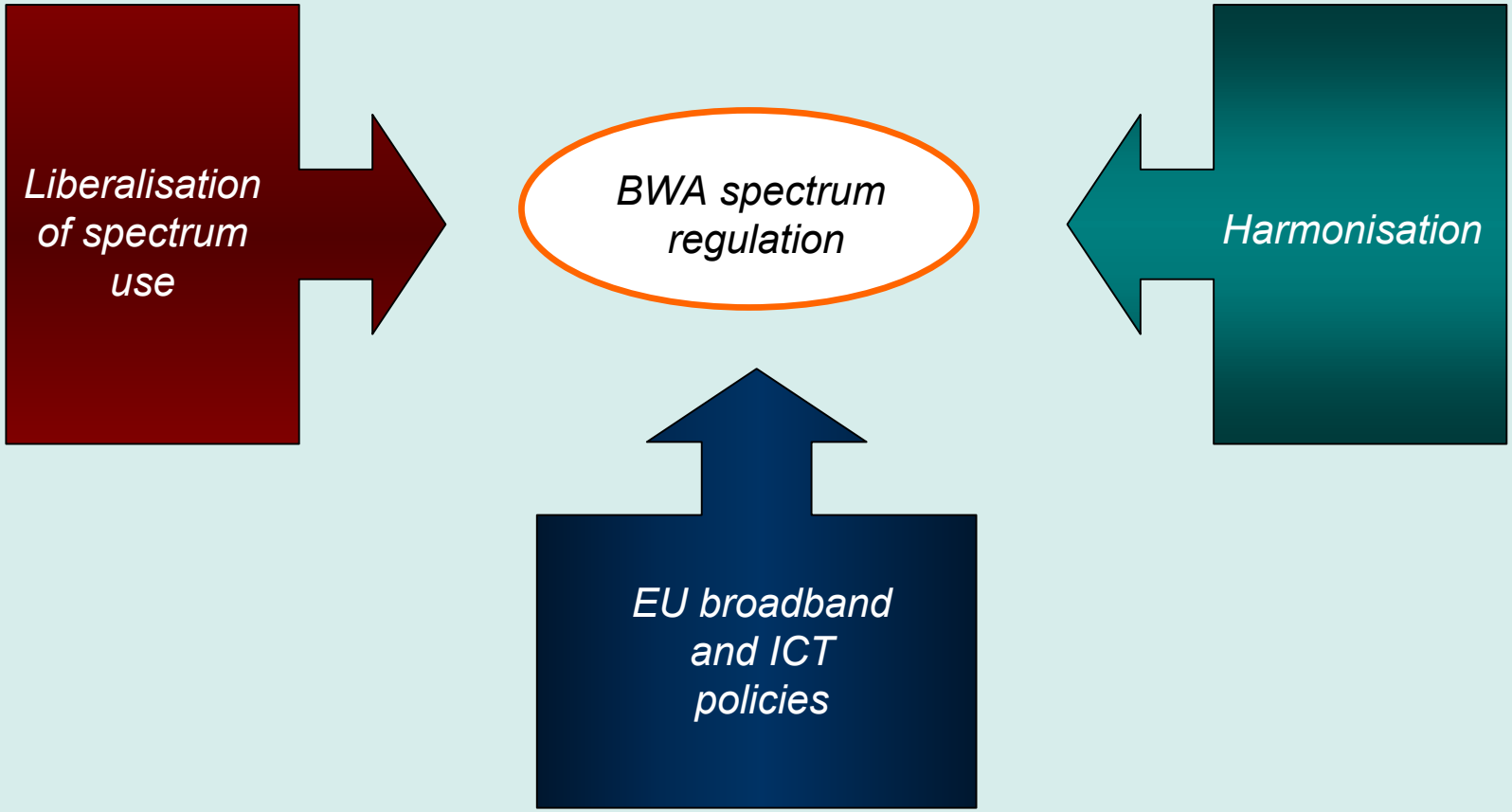
- 2.5 GHz designated for IMT-2000
  - ECC Decision(02)06 – harmonised IMT-2000 expansion band to be made available by January 1, 2008
  - ECC Decision(05)05 – channelling plan for efficient use
- 3.4 - 3.8 GHz identified as preferred band for FWA
  - ERC Recommendation 13-04 and ERC Recommendation 14-03 – FWA in 3.4 – 3.6 GHz
  - ERC Recommendation 12-08 – PMP FWA in 3.6 – 3.8 GHz
  - ECC Recommendation (04)05 – harmonised spectrum assignment conditions for technology-neutral broadband FWA in 3.4 – 3.8 GHz
- 5.8 GHz – no CEPT recommendations
  - opened for FWA in some countries on national basis
  - ECC Report 68 proposed compatibility studies

Spectrum - Current CEPT regulations

- September 2005 ECC meeting in Koblenz - proposal to develop
  - ECC Decision for fixed and nomadic BWA in 3400-3600 MHz and 3600-3800 MHz
  - ECC Recommendation for fixed and nomadic BWA in 5725-5875 MHz with priority to work on 3.6 and 3.8 GHz

- Regulatory objectives
  - To secure ease of access along with availability of spectrum
  - Licensed 3.5 GHz and unlicensed 5.8 GHz seen as complementary opportunities
  - More flexible licensing scheme in 3.5 GHz
  - To clarify fixed and nomadic aspects
  - To clarify sharing of 5.8 GHz with existing spectrum uses

Spectrum – EU policies for BWA



Spectrum – EU policies for BWA

- EU broadband and ICT policies
  - Lisbon Agenda sets the objective to build a fully inclusive Information Society based on widespread use of ICT
  - Broadband is seen as the key enabling infrastructure of a modern knowledge based society
  - e-Europe program sets out a strategy to make high speed Internet access over a variety of technology platforms widely available to businesses and citizens throughout the EU at affordable prices
  - BWA is seen as reliable and cost effective alternative to wire-based broadband – xDSL, cable, PLC, fibre…

Spectrum – EU policies for BWA

- Liberalisation of spectrum use instead of current 'command and control'
  - more market-based approach to spectrum use
  - faster and more flexible access to spectrum
  - promoting new technologies and innovation

- WAPECS – RSPG opinion November 2005
  - liberalisation on technology and service neutral basis of specific frequency bands to be agreed between Member States
  - 2500-2690 MHz and 3.4-3.8 GHz among possible WAPECS bands
  - communication on WAPECS mid-2006

- Liberalisation of 2500-2690 MHz - IMT-2000 expansion band
  - lack of support among Member States
  - scaled-down version for 2570-2620 MHz proposed

- Secondary spectrum trading - new policy approach from 2010?

Spectrum – EU policies for BWA

- Why old-fashioned spectrum harmonisation is still important?
  - promoting single market for BWA-applications
  - economies of scale and interoperability for users
  - eliminating divergent intra-EU regulations

- EC mandate to CEPT to harmonise BWA spectrum in the EU
  - 3.4-3.6 GHz priority with extension to 5.8 GHz and additional future ranges
  - compatibility studies with other uses
  - usage modes - fixed, nomadic and mobile
  - technology neutrality and licensing regimes
  - July 2006 final report from CEPT

Licensed versus unlicensed spectrum

Licensed spectrum

+ protection against interference
+ predictable operational environment
- complex and lengthy licensing process

Unlicensed spectrum

+ easy access to spectrum
- interference
- uncertain QoS and available capacity
- transmission power limits
- lower frequencies better suited for longer range coverage

- *More desirable in metropolitan areas where multiple operators are more likely*
- *More attractive to larger carriers deploying commercial services on a wider scale basis*

- *Inexpensive solution for rural areas with low population densities and little competing uses*
- *Attractive option for introducing new technologies*

BWA spectrum assignments across Europe

- Frequency bands
  - 3.5 GHz allocated for FWA on licensed basis
  - Other bands – 10.5 GHz, 26 GHz, 28 GHz – less co-ordinated
- Historical background – WLL in late 1990s
  - lack of standardisation
  - proprietary PMP technologies
  - slow deployment on a limited scale
  - returned licences
  - recent standardisation efforts revived interest in 3.5 GHz spectrum
- Assignment procedures
  - vary from auctions to ‘first come first served’
  - ‘light licensing’ – simplified registration procedure

BWA spectrum assignments across Europe

- Assignment blocks
  - typically ranging from ~10 MHz to ~28 MHz (single or duplex)
  - broadband services require at least ~14/28 MHz

- Duplexing technique – non-harmonised, both TDD and FDD
- Number of licences – 1 to 10 national and/or multiple local licences
- Service restrictions – limited to residential services in some countries
- Technology restrictions – no mandated standard but binding original choice of technology
- Fixed/nomadic/mobile use – often limited to fixed use but nomadic use allowed in principle
- Power limits – less relevant in a licensed band

Country cases - Austria

- October 2004 – Auction for WLL licences in 3.5 GHz in 6 regions
  - 17 spectrum blocs – between 2 x 21 MHz and 2 x 42 MHz each
  - Technology neutral
  - Auction proceeds – € 464,000
  - Winners – WiMAX Telecom, Telekom Austria, Telekabel, Teleport

- February 2001 – Auction for WLL licences in 26 GHz in 6 regions
  - 9 spectrum blocs – between 2 x 56 MHz and 2 x 112 MHz each
  - Duplexing technique – FDD
  - Auction proceeds – € 1,351,715
  - Winners – eTel, Centrowave Breitband Services

- April 2006 – Sealed-bid auction for BWA licences in 450 MHz covering rural areas
  - 3 spectrum blocs – 2 x 1.25 MHz each
  - Technology neutral, to be used for public mobile BWA
  - Auction proceeds – € 5,974,900
  - Winners – T-Mobile (1 block, Flash OFDM) and
    Green Networks (2 blocks, CDMA450)

Country cases - Bulgaria

- October 2005 – 2 auctions for four national BWA licences in 3.5 GHz
  - Licences – 2 Class A (2 x 21 MHz) and 2 Class B (2 x 10.5 MHz)
  - Provision of BWA Internet, telephony and multimedia services
  - Technology neutral
  - Auction proceeds – BGN 22,382,000 (€ 11,443,000)
  - Winners – Trans Telecom and Cablenet (Class A), Nexcom Bulgaria and Mobiltel (Class B)
  - Validity – 10 years
  - Commercial launch – one year from the issue of licenses - December 2006
  - Coverage of at least 10 towns and a minimum of 20% of the population for Class A, and 15 % of the population for Class B licenses.

Country cases - Croatia

- September 2005 – April 2006 several ‘beauty contests’ for 21 regional BWA concessions
  - Provision of voice telephony and data services
  - Technology neutral
  - Spectrum block per licence - 2 x 21 MHz or 2 x 14 MHz
  - Winners – VIPnet, Odašiljaci i Veze, Portus, Optima Telekom, WiMAX Telecom, T-HT, Novi-Net, Iskon Internet
  - WiMAX Telekom is a multinational WiMAX service provider in Europe: In Austria and Slovakia, it owns country-wide licenses and already serves over 1000 customers on its active networks

Country cases - France

- 2 national licences in 3.5 GHz plus 2 licences in each of the 22 regions in 26 GHz awarded in auction procedure by ART in July 2000
- Currently in operation: Altitude Télécom (national licences in 3.5 Ghz and 26 GHz) and Neuf Cegetel (18 regional licences in 26 GHz)
- In August 2005 the Ministerial Decree on WLL authorisation procedure in 3.4-3.6 GHz band approved ARCEP proposal to grant 2 WLL authorisations in each of the 22 French regions
- Each licensee will be granted two 15 MHz blocks of spectrum in 3.5 GHz
- Possible extension to 3.6-3.8 GHz and even to 5.4-5.7 GHz band applying DFS techniques
- New authorisation procedure for WLL:
  - where demand does not exceed available frequencies - authorisations on a first come first served basis
  - in areas with more demand for licences - a beauty contest selection

Country cases - Germany

- BNetzA is recycling WLL frequencies in 3.5 GHz to be used by newer BWA technologies such as WiMAX
- Flexible registration procedure, named ‘licensing light’, aiming to distribute as many licences as possible
- Applications were due on February 28, 2006
- Applicants could select coverage areas and needed bandwidth (maximum: 2x7 MHz paired = 28 MHz)
- BNetzA received 900 applications
- For most parts of Germany - more registrations than available frequencies
- BNetzA will consult on the tender procedures for these regions in spring and launch tenders (auctions) in autumn 2006

Country cases - Sweden

- Beauty contests in 2002-2005 for regional and national FWA licences
  - 3.5 GHz – 21 regional and 2 national (2 x 28 MHz each)
  - 10.5 GHz – 12 regional (2 x 70 MHz)
  - 26 GHz – 1 national (2 x 168 MHz)
  - 28 GHz – 1 national (2 x 168 MHz or 2 x 112 MHz, depending on a region)
- Returned licences re-issued on a first come first served basis
- Fixed and nomadic BWA applications
- In 2006 PTS intends to issue regional technology neutral licences for BWA
- Consultations on 3.6-3.8 GHz band and 2.6 GHz (IMT-2000) expansion band

Other regulatory considerations

- Interconnection
- Universal service and economic aspects
- Privacy and security issues
- Access to emergency services