Title to Spectrum:
Who Will Own the Spectrum in the Future

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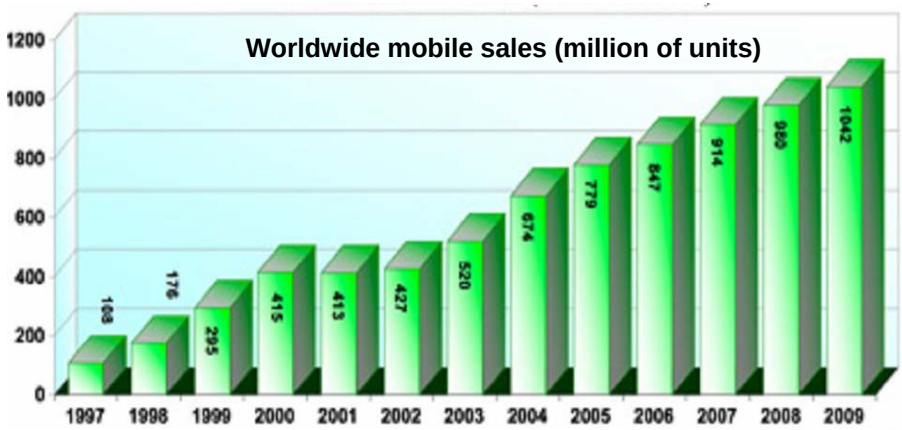
Spectrum – why it is so important?

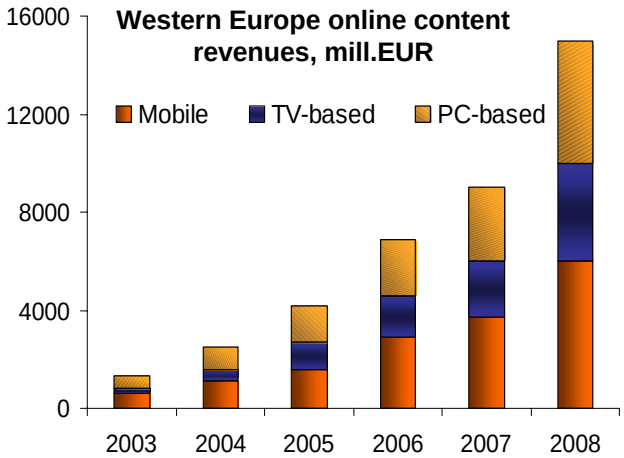
✓ The demand for radio-based applications grows in line with the increasing mobility of the society.

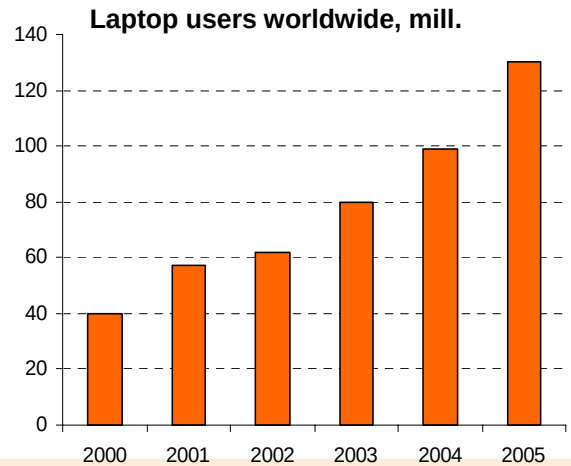


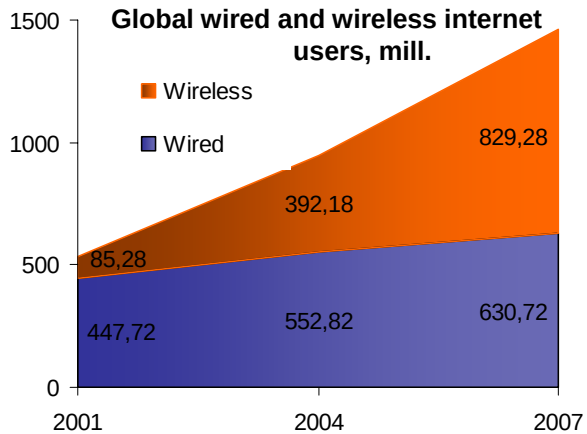
✓ World society rapidly realizes the benefits and advantages of getting any services, anytime and anywhere. This leads to the fundamental changes…

… the world is going mobile

… the world is going wireless







Sources: EITO, Portio Research, eMarketer, Gartner Dataquest

Spectrum – why it is so important?

- ✓ The radio spectrum
  - ✓ Is a key resource for many ordinary services in today's society – mobile, wireless communications, TV and radio broadcasting;
  - ✓ Supports public services - defense, radio astronomy, space research and other scientific activities, i.e. is important input into other economic sectors;
  - ✓ Plays a major part in developing rural areas (wireless broadband applications), this means, that it plays important role in bridging "digital divide" as well.

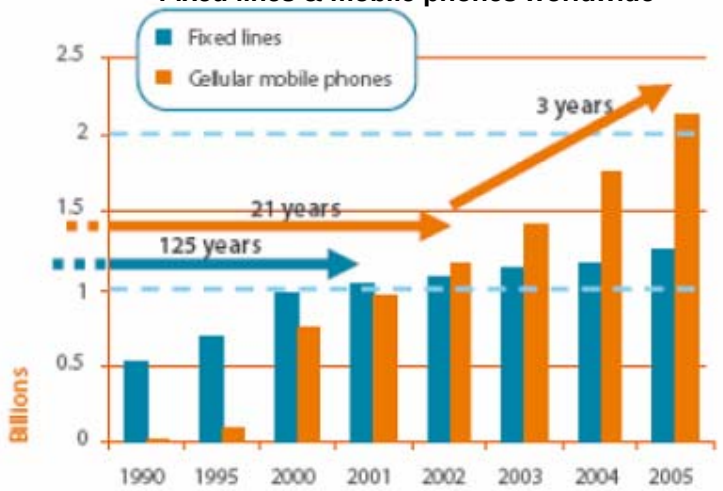
✓ In two-thirds of the world's countries, mobile services exceed fixed lines.

✓The number of mobile phone subscribers worldwide is expected to be 2.6 billion in 2006 and to rise up to 4 billion by 2010, thanks to the development of ultra-low-cost handsets

✓By the end of 2007, it is predicted that

- ✓there will be 2.5 billion GSM subscribers – nearly 1 in 3 of the world's population
- ✓global subscriber revenues will be similar in value to worldwide crude oil production.

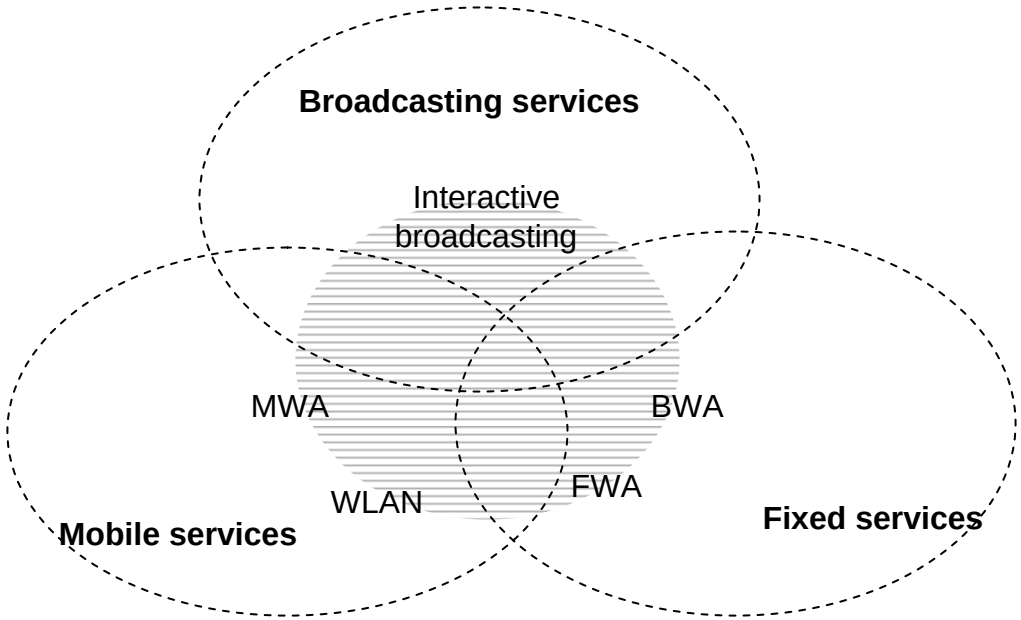
Fixed lines & mobile phones worldwide



Sources: ITU Information Society Statistics Database, OVUM, GSMA, iSuppli.

Spectrum management – why it is so important?

- ✓ But …
  - ✓ The available radio spectrum is limited;
  - ✓ The convergence of services is putting pressure for regulators to adapt quickly, to abolish unnecessary barriers and introduce greater flexibility.



The convergence of services

Spectrum management – why it is so important?

- ✓ New technologies lead to less rigid ties between frequency bands and services.

✓New technologies:

- Broadband Wireless Access (BWA);
- Systems beyond IMT-2000;
- Ultra-Wideband (UWB);
- Mobile-Satellite Service MSS on 2 GHz;
- GSM on board of aircrafts and vessels;
- Short Range Devices (SRD);
- Cognitive radio systems;
- Software defined radio technologies.

✓ Target frequency bands:

- 450 MHz, 900 MHz, 2 GHz, 2.3 GHz, 2.6 GHz, 3.5 GHz, 3.7 GHz, 5.8 GHz.

Spectrum management – preconditions

✓The scarcity of spectrum becomes more and more tangible as demand for spectrum grows;

✓ Spectrum knows no borders;

✓ The value of spectrum in changing over time;

✓ New technologies show a great promise in how to make more effective use of spectrum;

✓Radio spectrum is (and will be) used not only for commercial, but also for public purposes;

✓ The goal of spectrum regulation should be the same as the overall goal of ICT regulation – utility maximisation of end-user (the pursuance of the long-term interests of end-users).

Spectrum management – approaches

✓ 4 main approaches

Command and control	Unlicensed spectrum - Commons	Market	Unrestricted usage
The regulator determines *how* and *by whom* the spectrum is going to be used.	The regulator determines *how* the spectrum is going to be used, no restrictions on *who* can use the spectrum.	Users determine *how* they are going to use spectrum; Market mechanisms are used to determined *who* will be the users.	No restrictions on *who* and *how* can use spectrum.

High ← *Degree of regulatory intervention* → *Low*

Spectrum management – trading

Command and control	Unlicensed spectrum - Commons	Market	Unrestricted usage
Allocation is not liberalised, secondary assignment is forbidden	Unavailable due to absence of tradable usage rights.	Allocation is liberalised, secondary assignment is allowable	Unavailable due to absence of tradable usage rights.

✓All the approaches have particular strengths and weakness. The task for governments in determining the most appropriate spectrum management framework is to identify the relevant combination of methods that will result in the most efficient use of the spectrum.

Spectrum management – transition

- ✓ Driver for changes – need to open the space for innovation, creativity and entrepreneurship
  - ✓ rapidly changing environment of electronic communications, impressive technological progress, convergence, changing habits of end-users consumption creates the pressure for existent spectrum regulation.
- ✓ Trend of changes – transition from Command and control to Market approach, i.e. making spectrum regulation more flexible
  - ✓ Market-based approach for spectrum management might be considered as a “natural” way to improve the efficient use of the radio spectrum. The starting proposition in a market economy is that the inputs (spectrum might/should be treated as an input) are best allocated to produce particular outputs by the market process, which co-ordinates the interests and information of agents, in a way best calculated to encourage efficiency and innovation. But it is not a panacea… .
  - ✓ Once spectrum is assigned under commons method, it may be extremely difficult to change its use or to pull it back for assignment under a different method.
  - ✓ Most likely the combination of command and control, market and commons approach could co-exit.

Flexible spectrum management

- ✓ Spectrum trading – a tool to simplify transfer of spectrum usage rights, improve efficiency in use of spectrum and to lower entry barriers without or with limited intervention from regulator. Spectrum trading actually solves the problem of *who* will use the spectrum.

Pros	Cons
✓Efficiency;	✓Transaction costs
✓Transparency;	✓Interference issues and the resulting risks to safety
✓Competition;	✓Standardisation/harmonisation
✓Innovations.	✓Possible concentration

✓Liberalisation - the relaxation of restrictions on services and technologies associated with spectrum usage rights. Liberalisation solves the problem of *how* to use the spectrum.

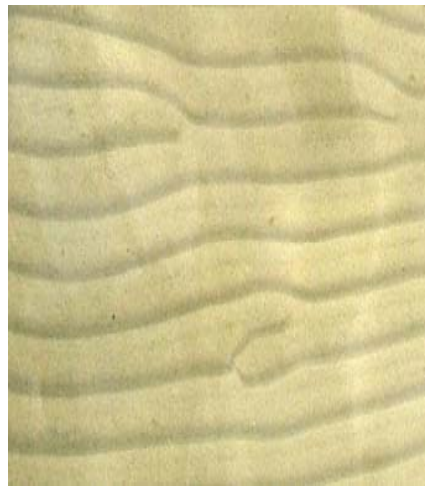
✓Spectrum trading without liberalisation will be limited to transfers of existing usage rights. Liberalisation alone will only enable existing users to switch technologies and services.

✓Where licensed spectrum usage rights are necessary, they in principle should be tradable to improve efficiency in use of spectrum (and to lower entry barriers).

✓However the spectrum trading is an important policy tool in the management of radio spectrum, although it is not always appropriate for all bands. Therefore, spectrum trading will co-exist alongside other spectrum management approaches.

Spectrum management – where to draw the lessons from

- ✓ Title to land:
  - ✓ Major economic input till XVIII - XIX century
  - ✓ Feudalism gradually created private ownership of the land:
    - ✓ From limited tenure to hereditary property
      - ✓ Maintenance and protection of a fiefdom by a lord
    - ✓ Land based economy required proper attitude towards resource management
    - ✓ Advanced working and economic culture
  - ✓ Industrialisation introduced new service oriented land perspective:
    - ✓ Expansion of industrial plants, improved roads, water canals and railways
  - ✓ Effect of privatisation – encouragement of entrepreneurship, effective resource employment
    - ✓ Also the goal for post-Soviet land-reform



Spectrum management – where to draw the lessons from

- ✓ Title to land:
  - ✓ Issues to consider:
    - ✓ Infrastructure projects:
      - ✓ “Green field” investments, public infrastructures (e.g., roads)
      - ✓ The right to modify qualification and propose back for the market
    - ✓ How to ensure execution of state functions
      - ✓ Part of land still publicly owned
      - ✓ Some – publicly used
        - ✓ Parks etc.
      - ✓ Other used for specific governmental needs
    - ✓ Relationship with extraction of national resources as well as air and space law
      - ✓ Underlay and overlay
    - ✓ Right to impose specific restrictions for the public interest, easements, rights-of-way
    - ✓ Shared ownership
      - ✓ Apartment blocks
  - ✓ Apparent similarities:
    - ✓ Key resource
    - ✓ Property rights
    - ✓ Interference among users
    - ✓ Improvement of the efficiency of use due to technological development
- ✓ Are we going to privatise spectrum?

Spectrum management – challenges ahead

✓ Although the EC Framework Directive facilitates the introduction of spectrum liberalization and there has been fairly widespread recognition that the current regime of spectrum management in most of EU is insufficiently flexible, the pace of reform so far continues to be relatively slow.

✓ Furthermore, the EU efforts to introduce spectrum trading and liberalization only in some, very limited spectrum bands or small geographical regions might be treated as an experiment, resulting in a clear identification of main purposes, principles and the scope of the reform:

– Will there be any restrictions of spectrum trading? How these restrictions might influence the success of the reform?

–The shift to new spectrum management regime at regional (EU) level is probably acceptable only at initial phase, after which the gradual expansion of this practice should be discussed. As spectrum knows no border, the regionalization of spectrum management regime might result problems and inefficiencies, especially in the border zones of the region, e.g. Lithuania.

Spectrum management – challenges ahead

✓There is an emergent need to find more effective methods of international spectrum regulation.

–The ITU *Radio Regulations,* which define the allocation of different frequency bands to different radio services, are becoming obsolete and need to be revised…

-Spectrum bands of 3.4-3.6 GHz and 3.6-3.8 GHz are allocated to fixed service on a primary basis and to mobile service on a secondary basis, although new technologies, which shows clear interest in these radio frequencies, promises predominantly mobile service.

✓We should be ready for some issues, sensitive from the point of view of national policies, that will probably arise as a result of liberal spectrum management regime.

✓ E.g. the future of terrestrial broadcasting is vague. Terrestrial broadcasting uses a big part of the most valuable spectrum. But if we compare market values of broadcasting and mobile services (under the market approach market values are the main determinants of *who* and *for what* purposes is going to use spectrum), we already can see the first indications, that terrestrial broadcasting will have to yield ground.

–In Lithuania mobile market value is almost 5 times higher than the value of broadcasting market

–Mobile market value 1,2 bill LTL (348 mill Euro) vs. Broadcasting market value 254 mill LTL (74 mill Euro)

Spectrum management – challenges ahead

✓The implementation of spectrum trading and liberalisation is challenging…

Issues of interference, harmonisation, potential windfall gains and/or losses for existing spectrum users also still remain under discussion

…and it will take time to realise the full benefits of liberal policy approach.

✓But the challenge of reforming spectrum management is worth to be accepted since an effective introduction of spectrum markets would be:

- **beneficial, because** of the gains in competition, innovations, increased variety of services, improved consumers choice and access to new technologies and services at lower prices,

- and **necessary** because today's spectrum management has reached its limits due to technological progress, constantly increasing demand for spectrum and due to the speed of changes in business cycles and markets.

✓Finally - how far the liberalisation of spectrum will go and who will own the spectrum in the future? Will the process be evolutionary or revolutionary?

Thank you

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