

ITU Workshop on Ubiquitous Network Societies

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Radio Spectrum Management and Ubiquitous Network Societies

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Radio technologies an Integral Element of Ubiquitous Network Societies

- Mobility
- Wireless

1-Premises of prevalent Spectrum Management principles

- Spectrum scarce
- Administered Allocation and Assignment (AAA) needed to prevent signal interference
- Public Domain
- Market-Based Extension of Property Rights (ExPR)
- Special conditions to preserve Diversity of Opinions/Cultures (DOC)

1-1 Origins of Perceived Scarcity

- 30 years ago

- most of the used part of the radio frequency spectrum was reserved for radio and television broadcasting, military purposes and a few professional long-distance civilian links.

- **The radio technology boom**

- The progress made in electronics and microprocessors in the last 10 years: a whole new range of products and services made available to the general public:
 - Satellite broadcasting of television and radio programs with digital technology adding increasing quality and choice.
 - Mobile phones, for the main part using GSM technology
 - In the future, satellites will be used for these purposes, which will be of particular benefit to increasingly mobile populations.

Challenging Scarcity: present spectrum usage

- The real spectrum usage picture
 - The Carnegie-Mellon experiment
 - The US Survey
 - Europe ?

Challenging Scarcity

- SPECTRALIA Table

1-2 Challenging the AAA process

- Marginal challenge

- ➔ Improving the quality of emitters and receivers

- ... or Radical challenge

- ➔ Will

- *market mechanisms*

- or

- *future radio technologies*

- ➔ make AAA useless ?

1-3 Challenging the public domain nature of the frequency spectrum

- Radical Destruction: The full property rights challenge
 - ➔ Auctioning off the spectrum
 - ➔ privatisation big bang
 - ➔ Sunset of regulators
- Radical Extension: The advent of the Commons for
 - ➔ Innovation (anti-monopoly)
 - ➔ Public infrastructure
 - ➔ Freedom of speech/cultural diversity
- Marginal Change: Public Domain often considered of fundamental nature
 - ➔ Preserving some kind of State pre-eminence

1-4 Challenging the DOC: Diversity of Opinions/Cultures Framework

- Diversity of Opinions/Cultures
 - ➔ Freedom of speech/diversity
 - ➔ Government control
 - ➔ ...the one providing a rationale for the other
- Convergence and Relevant Market ?
 - ➔ Broadcasters only
 - ➔ Or: All media, including new
- Financial implications for the media/broadcasting industry

Responses: 2-1 market-oriented

- Anything goes: Can market mechanisms foster an efficiency revolution in spectrum usage?
- Auctions
 - USA PCS 93
 - Countries in Europe: the UMTS auctions
- The auctions bubble: **what bubble? true believers never doubt**

Responses: 2-2 The advent of 802.11x

- The unlicensed band (s)
- The “Commons” Challenge to property
 - ➔ IPRs
 - ➔ Spectrum

...A turning point ?

- New technologies and management methods might change thoroughly the way we look at future spectrum usage:
 - ⇒ Spectrum trading and clearing (re-allocation)
 - ⇒ Software defined radio allowing agile radio: dynamic (vs. static) allocation of the spectrum
 - ⇒ Mesh networks
 - ⇒ Frequency sharing and hopping
 - ⇒ Frequency on demand
 - ⇒ Optimisation of non-permanent uses
 - ⇒ Increased component (emitter and receiver) resilience and tolerance to interference
- How much flexibility is allowed?

3- What way to the Bright ...

- Omni-Body
- Multi-Service
- Pluri-Network
- A-Topic
- UBIQUITOUS

...Future

3-1 Radio Spectrum and market mechanisms: the uneasy alliance

- Let's have the market deal with inefficiencies
- BUT:
 - ➔ Is it consistent with competitive policy
 - ➔ Residual Differences among platforms regulations

Caveat about the Competitive Policy Viewpoint

1. Competition Economics have their doubts, shortcomings and ambiguities
2. They do not prevent having to make heroic assumptions and assessments about future technology and business developments and outcomes
3. It combines with already complex issues regarding the whole IT sector, as we can see the multiplicity of actors involved:
 - Public Services
 - Tlc operators and vendors
 - Broadcasters
 - but also actors inventing or reinventing themselves out of contiguous territories (like component suppliers-WIMAX)

Risks associated with granting PR?

- High Entry barriers to non-replicable resources:
Foreclosure of new entrants
- *Possible market dominance associated with vertical or horizontal integration: can it be controlled?*
- *Are we creating a potentially harmful situation with no remedies?*

3-2 Mixing the 3 basic models of spectrum management

- AAA : Administered Allocation/Assignment
- ExPR: Extension of property rights
 - ➔ Through Primary+Secondary markets
- Commons: expanded unlicensed band approach

The spectrum policy mix ahead:

- *A systemic analysis:*
- *Harmonised*
- *Flexibility*
- *...For Innovation*

What is on the actors' agendas?

- Governments: regulators vs cash-strapped budgets
 - ➔ The regulatory arm is not always keen on ExPR
 - ➔ If only because, in the end, it makes it redundant
 - ➔ The techies sympathise with the unlicensed prowess

What is on the actors' agendas?

- Governments: under the influence of budget needs
 - ➔ Welfare considerations
 - ➔ Domestic and Int'l Security Concerns
 - ➔ Preserving National or regional Champions: to a certain degree
 - ➔ Capturing the rents (possibly by maintaining them?)

What is on the actors' agendas?

- Public services
 - ➔ Careful but well-inclined to accept spectrum management evolutions

What is on the actors' agendas?

- Broadcasters: free spectrum!
 - ➔ Freedom of speech, diversity of opinions/cultures, argument
 - ➔ Strong political clout

What is on the actors' agendas?

- Telecom Operators

- ➔ Have accepted to pay “market” prices in exchange for rent-generating licences

The mix ahead:

- *What territorial extent the mixed regulatory framework (s)*

Strong International Component

- Caveat: Radio spectrum management is, by its nature, an international affair

What paths ahead?

The Harmonised Flexibility Mix

- AAA : Administered Allocation/Assignment
- ExPR: Extension of property rights
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Future Radio technologies diffusion rate



<i>Scenarios and strategies for the decade ahead</i>	Scenario 1 Advent of flexible use technologies	Scenario 2 No significant diff. In trend with present technology mix
ExPR Strategy	LOW	MEDIUM
Policy-Mix Strategy	HIGH	MEDIUM

Risk of regulatory inconsistencies

Is a policy mixing the 3 Regimes sustainable?

1. Potential competition between Wireless services of all sorts in the various frequency bands benefiting from diverse (paying or not paying) conditions
2. Potential competition between Wireless services of all sorts and services in the same market(s) provided on other platform
3. UMTS vs. WiFi (or WIMAX)

Questions for You... Variables and uncertainty areas

- Networks: Feasibility and timeframe of future radio technologies
- Services: scale and scope of marketable services
- Spectrum management methods: Optimality and Actors strategies

