Grupo de Tecnologías de la Información y las Comunicaciones

Developing a Cost Model to determine economic benefits of LTE in Digital Dividend

Thesis Project

May, 3-5, 2010

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Content

1. Research background
2. Project: Techno-economic analysis about 900 MHz band's reutilization
3. Developing a Cost Model to determine economic benefits of LTE in Digital Dividend
4. Methodology
5. Papers

GSM bands' Refarming in Europe

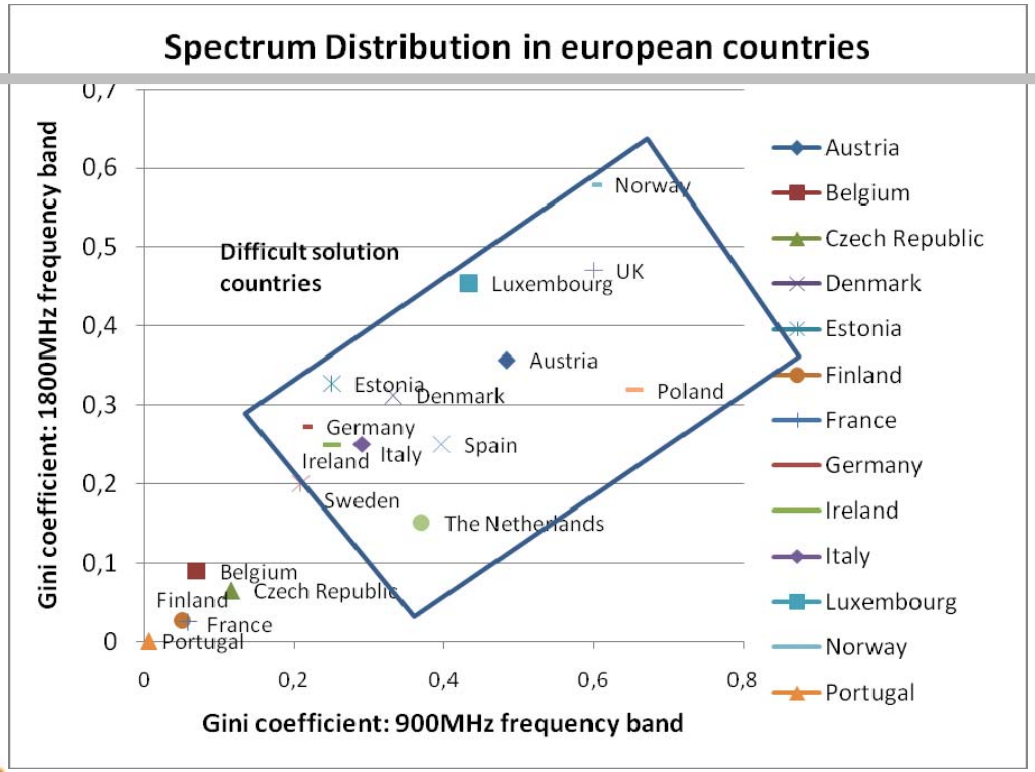
- Evolution of the spectrum management model towards a more flexible approach
- Technical and economical advantages of the release of these frequencies bands
- Public policies adopted (or considered) in 7 countries of the European Union:

GSM bands' Refarming

In the process			Refarmed			
Spain	United Kindom	Germany	Sweden	Finland	France	Italy

Research guidelines

- Analyze public policies and its impact in competition (Spectrum distribution, assignment mechanisms, ex-ante measures, etc)



Techno-economic analysis about 900 MHz band's reutilization 1/4

Joint Project

- UPM- State Secretariat for Telecommunication and the Information Society (SETSI)

GOBIERNO DE ESPAÑA | MINISTERIO DE INDUSTRIA, TURISMO Y COMERCIO | SECRETARÍA DE ESTADO DE TELECOMUNICACIONES Y PARA LA SOCIEDAD DE LA INFORMACIÓN

POLITÉCNICA

Objetive

- Assessment of the benefits of introducing a HSDPA carrier at 900 MHz in Spain
- Based on Ofcom's Model and the LRIC model used by the French NRA, ARCEP, to determine the mobile call termination prices, to determine cost savings of the usage of 3G technologies in GSM bands
- Calculate de number of base transceiver station (BTS)

Techno-economic analysis about 900 MHz band's reutilization 2/4

General assumptions

- Payback period 20 years (2008-2027)
- NPV with a rate of return of 11,5%
- It is estimated an increase of traffic in mobile network till 2015, then the traffic is maintained

- Access network and core network associated costs are estimated-> savings derive from access network

	Population density per km^2	User density per km^2
Dense urban	25.000	10.243
Urban	10.000	4.097
Suburban	1.000	410
Rural	450	184

Demand scenarios	Average volume downloaded per user per day
Low	1MB/user/day
Base	10MB/user/day
High	30MB/user/day

$$Econimic \quad benefits:$$
$$= 2100\ MHz\ UMTS/HSDPA\ deployment\ costs$$
$$-\left(\begin{array}{l} 900\ MHz\ UMTS/HSDPA\ deployment\ costs - 2100\ MHz \\ + cost\ of\ releasing\ 900\ MHz\ band\ of\ GSM\ services \end{array}\right)$$

Techno-economic analysis about 900 MHz band's reutilization 3/4

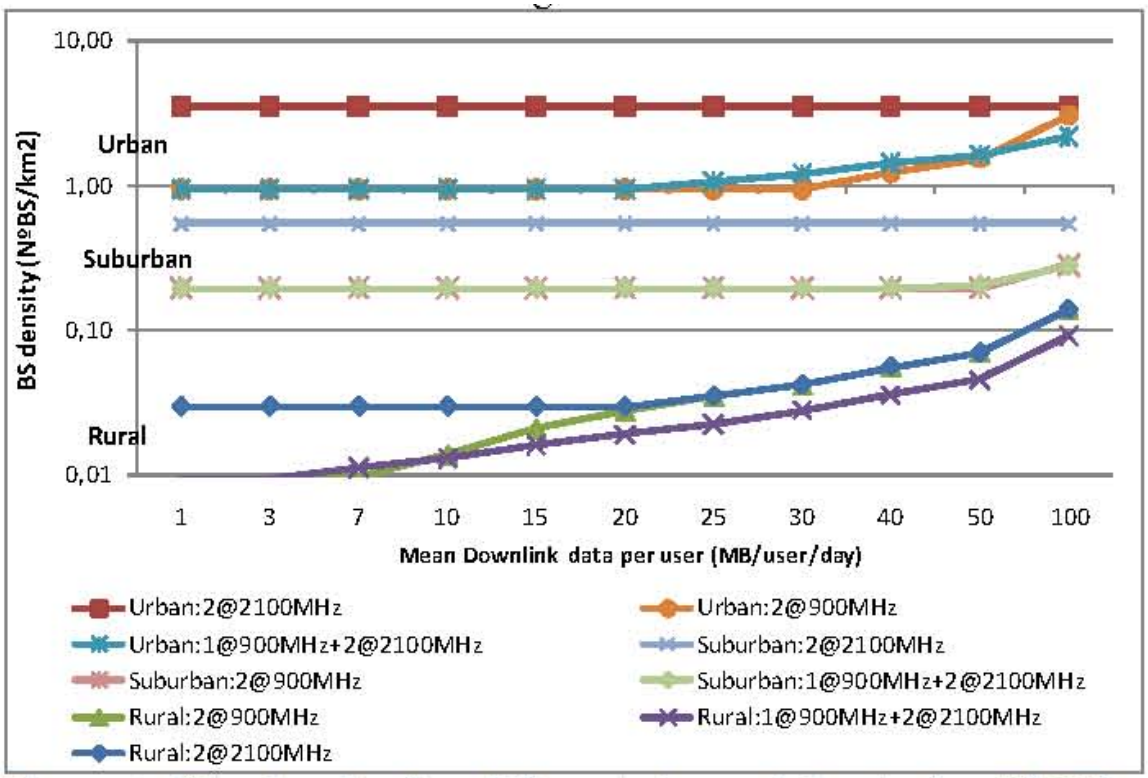


Figure 1 Site density for different demand levels for UMTS networks with different numbers of carriers and frequencies

Techno-economic analysis about 900 MHz band's reutilization 4/4

Results

- As it can be observed, the savings achieved in the lower level of demand (coverage limited networks) .

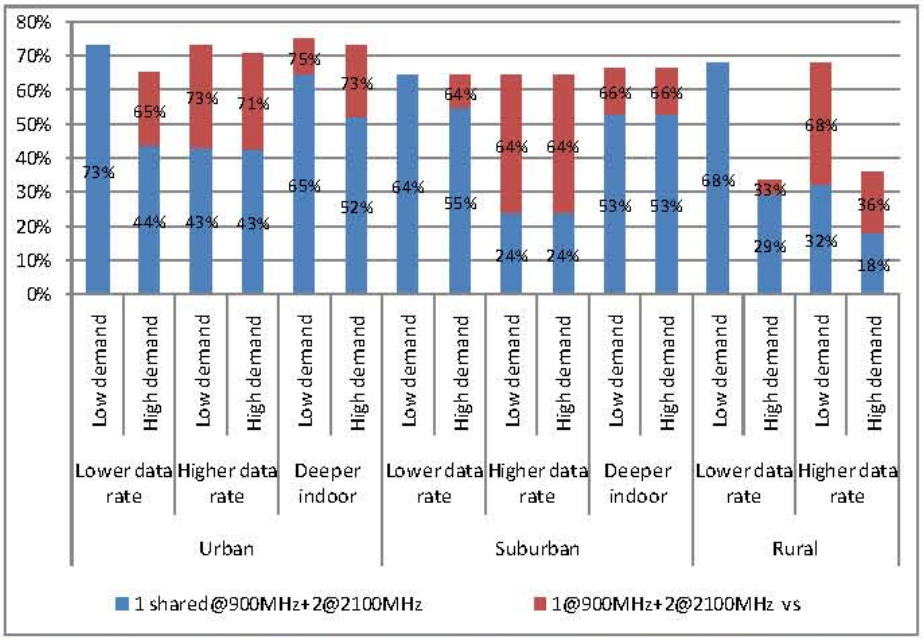


Figure 3 Savings on the site number provides by the introduction of a HSDPA carrier at 900MHz in an UMTS2100 network for different quality of services parameters

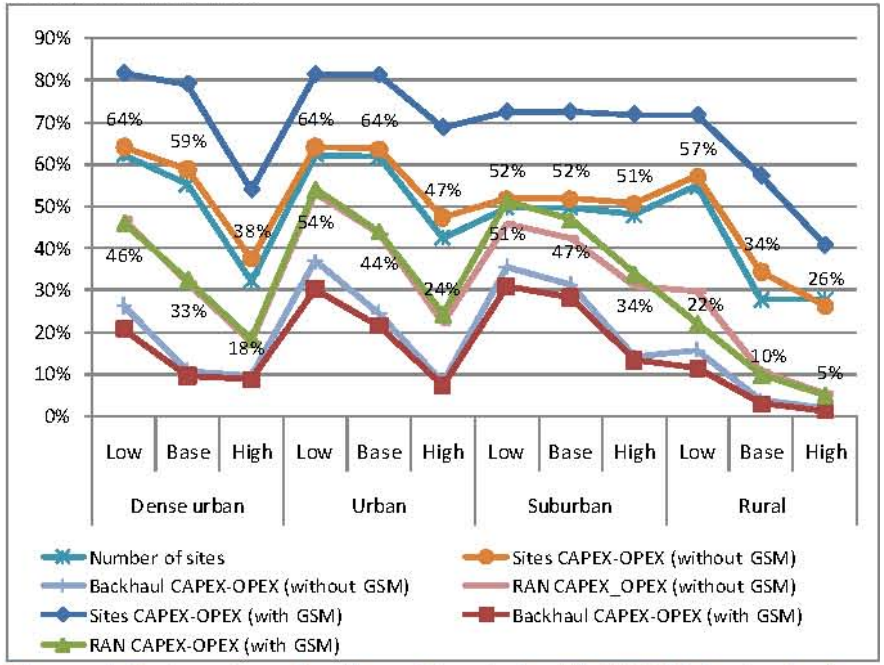


Figure 4 Cost savings for the roll-out of a UMTS900 instead of a UMTS2100 in the greenfield scenario

- However, these savings decrease as the traffic demands increase.

Source: Antolín Moral, Arturo Vergara, Jorge Pérez and Catalina Ovando. **Assessment of the benefits of introducing a HSDPA carrier at 900 MHz**

In review process at IEEE GLOBECOM 2010

Developing a Cost Model to determine economic benefits of LTE in Digital Dividend

General Objetive

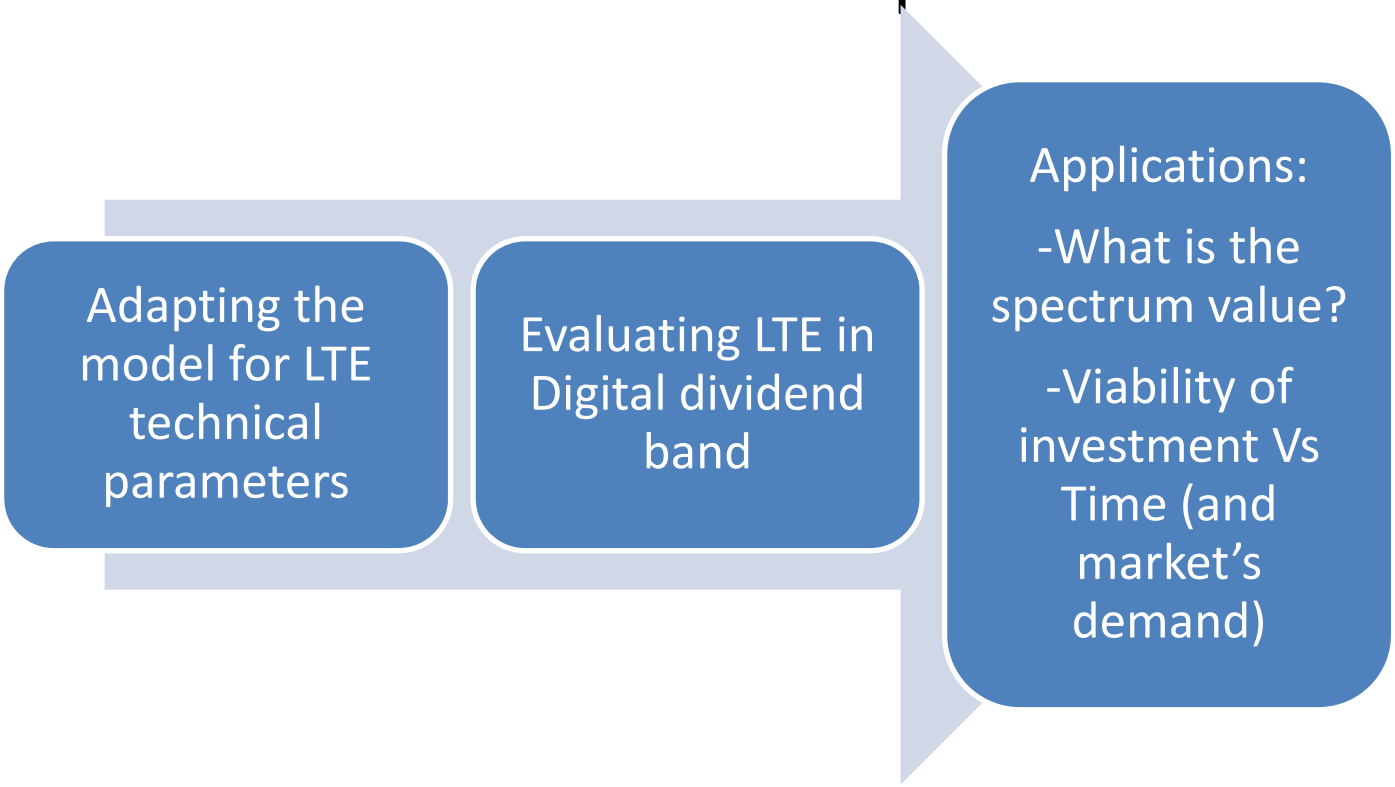
- Analyze the network rollout costs of LTE mobile networks and quality of services (indoor coverage, bit rate achieved in the edge of cells, etc.) in 800 MHz bands'

Specific objectives

- To develop a (techno-economic) tool that could be useful for determine economic viability of LTE in 800 MHz band
- Analyze regulatory issues that could lead from the techno-economic analysis

Methodology

- Based on Ofcom's Model and the LRIC model used by the French ANR, ARCEP, to determine the mobile call termination prices



Papers

- Catalina Ovando, Antolín Moral, Jorge Pérez (2010). **El refarming de las bandas GSM en Europa**. ACHIET. Vol. 121, 10-26.
- Jorge Pérez, Antolín Moral, Mª Catalina Ovando. (2009) **Claves y retos de la gestión del espectro**. Regulatory and Economic Policy in Telecommunications. Vol. 2. Ed: Gabinete de Estudios de Economía de la Regulación (GEER) Dirección de Política Regulatoria Telefónica España. March 2009. Madrid, España.
- Catalina Ovando, Antolín Moral, Jorge Pérez. (2009) **GSM Band's Refarming Public Policy Review**. 48th FITCE Congress – The Forum of ICT Professionals. Prague, (Czech Republic).
- Jorge Pérez, Catalina Ovando. (2008**) El "refarming" de las bandas de servicios móviles en España**. Bit. Vol. 170 Ed: COIT-AETIC, 63-64.

In Review Process:

- Antolín Moral, Arturo Vergara, Jorge Pérez and Catalina Ovando. **Assesment of the benefits of introducing a HSDPA carrier at 900 MHz**

Congress: IEEE GLOBECOM 2010

- Antolín Moral, Jorge Pérez Arturo, Vergara and Catalina Ovando. A model to estimate the cost of partial clearance of spectrum in the 900 MHz band.

Congress: 21st Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC 2010)

- Antolín Moral, Arturo Vergara, Jorge Pérez and Catalina Ovando. **The refarming of the GSM bands: is it possible to find best practices from experience already accumulated?**

Congress: 2010 European Regional Conference of the Telecommunications Society

Thank you

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