Regional Seminar on Costs and Tariffs for Member Countries of the Regional Group for Asia and Oceania (SG3RG-AO)

WiMAX Implementation

A presentation by Dr. Antonio G. Zaballos
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1. Transformation of the access network
Transformation of the access network

In Europe there is a current debate on the geographic segmentation and the way in which the National Regulatory Agencies (NRAs) should change the regulatory framework to capture the reality in the different markets included within the EU Recommendations.

There is an increasing debate on the ex ante obligations that are imposed to the SMP Operators. The introduction of sociodemographic and economic conditions is key in the market analysis.

Cable operators and ULL operators go first to those areas which are more attractive economically (yellow points).
In the case of Spain, Telefónica’s market share is diminishing in those regions where cable operators and ULL operators are increasing their market share.

Due to this geographic segmentation Telefónica is requesting to the Spanish Telecom Regulator (CMT) a softer ex ante regulation. Something similar is happening in other EU countries as France, UK, Italy or Austria.
Due to the existence of different alternatives of access (cable network, ULL, bitstream, mobile), the wholesale and the retail prices of the incumbent operator are disciplined in such a way that no anticompetitive behaviour (excessive price, discrimination, dilatory tactics, etc) is likely to occur.

Therefore, the incumbent operators are prevented of behaving anticompetitively.
Transformación de la red de acceso

Depending on the population density, the sociodemographic and the economic conditions there will be a coexistence of network.

Mobile network for specific users and in particular regions are becoming perfect substitutes.
Network competition occurs in those regions which are technical and economically attractive.

Regulation depends on the existing level playing field competition. It will apply mainly in non-competitive areas.

Innovation is encouraged.

- It grounds on service based competition ignoring any other alternatives
- Regulation is key for guaranteeing competition, there is no any confidence on the market and the self regulation
The debate nowadays is whether ex ante obligations should be imposed to the SMS termination.
### Steps for market analysis

#### Market included in the “old” Recommendation (February 2003)

| 1. Access to the public telephone network at a fixed location for residential customers |
| 2. Access to the public telephone network at a fixed location for non residential customers |
| 3. Publicly available local and/or national telephone services at a fixed location for residential users |
| 4. Publicly available local and/or national telephone services at a fixed location for non-residential users |
| 5. International telephone services publicly available at a fixed location for non-residential |
| 6. Minimum set of leased lines |
| 7. Call origination in the public telephone network at a fixed location |
| 8. Call termination in individual public telephone networks at a fixed location |
| 9. Transit services in the public fixed telephone network |
| 10. Wholesale provision of unbundled access to provide broadband and voice services |
| 11. Wholesale provision of broadband access |
| 12. Wholesale market for leased line terminal segments |
| 13. Wholesale market for leased line transit segments |
| 14. Call access and origination in public mobile telephone networks |
| 15. Voice call termination in individual mobile networks |
| 16. Roaming |
| 17. Broadcasting services for the delivery of content transmitted to final users |

#### Markets considered in the “new” Recommendation (December 2007)

| 1. Access to the public telephone network at a fixed location for residential and non residential customers |
| 2. Call origination in the public telephone network at a fixed location |
| 3. Call termination in individual public telephone networks at a fixed location |
| 4. Wholesale network infrastructure access at a fixed location |
| 5. Wholesale broadband access |
| 6. Wholesale market for leased line terminal segments |
| 7. Voice call termination in individual mobile networks |
| 8. Roaming |
| 9. Broadcasting services for the delivery of content transmitted to final users |

#### Three criteria test:

1. Presence of high and non transitory barriers to entry.
2. Market structure which does not tend towards effective competition within the relevant time horizon.
3. Insufficiency of competition law alone to adequately address the market failure(s) concerned.
2. Comparison with other technologies
Comparison with other technologies

The graphs below show a cost per user comparison between the different access technologies. For high speeds, WiMAX is cheaper at low penetration rates but becomes less profitable than other technologies as the penetration rate raises. This is due to the difficulties that WiMAX presents when providing high speed to a large number of customers. Nevertheless, at normal speeds such as 6/2 Mbps, WiMAX presents lower costs at every penetration rate.
3. Success stories
Success stories: USA

The company
Clearwire is a wireless internet service provider (WISP) serving markets in the United States, Ireland, Belgium, Spain, Denmark (with Danske Telecom), and Mexico. At present, Clearwire uses wireless technology, dubbed Pre-WiMax, transmitted from cell sites over licensed spectrum of 2.5-2.6 GHz in the U.S. and 3.5 GHz in Europe. Clearwire is now implementing WiMAX 802.16e networks in many markets.

Services and customers
Clear, is offering internet services of home and mobile Internet at speeds up to 6 Mbps and home VOIP telephony.
Additionally, Clear is offering several accessories such as:
• **CLEAR Spot Personal Hotspot**: Create a portable, secure Wi-Fi hotspot instantly that you can use with up to eight Wi-Fi-enabled devices.
• **CLEAR Voice* Adapter**: Connect your CLEAR modem to a landline phone, so you can talk whenever you want,
• **Notebooks with Embedded WiMAX**: More than 35 notebook models from five PC manufacturers certified already, with 24 models with special WiMAX card

At the present, Clear has **688,000** including **642,000** Retail Subscribers and **46,000** Wholesale Subscribers. In 2009, revenues increased 19 percent to $274.5 Million.

Coverage
In January 2009, Clearwire branded its NGA WiMAX network **Clear** rolling its network at different USA sites to offer 4G Wimax services to 120 Million people. The present coverage is shown in the following map.
Success stories: Europe

The company

In May 2008, Imagine Group acquired Irish Broadband in order to own 27 WIMAX licenses for 3.5 Ghz. In October 2009, Imagine launched fixed and mobile broadband services using 4G Mobile WiMAX technology. They offer fast Internet access with speeds up to 10 Mbps per user device. Imagine is now bringing competition and superior speeds to Ireland (one of the 15 EU countries with the slowest broadband connections) with no data caps on both services. At present, Imagine is investing over 100 M€ in Wimax.

Coverage

Imagine is covering a population of over 1 million today and 2.6 million by the end of 2010.

Services and customers

Imagine is offering the following plans:

- **VOIP phone**: 20 €. No limit calls to Ireland and UK. That prize is 50% cheaper than traditional operators in Ireland.
- **Home Broadband**: 30 €, 3 Mpbs Broadband, with no line rental. That prize is 40% cheaper than traditional operator.
- **Mobile Broadband**: 15 €, 7 Mpbs with a monthly limit of 15 Gb.

Ireland is a perfect market for WiMAX due to its low broadband penetration rate. As in the previous case, Imagine will also offer laptops with Intel embedded WiMAX modules.

Imagine is not only the relevant successful case in Europe. In Netherlands, one of the most competitive markets in Europe Worldmax has develop a commercial Mobile WiMAX networks in the 3.5 GHz range, blanketing the entire metropolitan area of Amsterdam. Worldmax is offering 8 Mbps indoor and outdoor data rate with no data limits.
Success stories: Japan

**The company**
UQ Communications is a telecommunications company in Japan that provides nationwide WiMAX service. On **Feb. 26, 2009**, UQ started its mobile WiMAX service in Tokyo, Yokohama, and Kawasaki. UQ Communications holds a 2.5 GHz license in Japan. Among UQ investors are Intel Capital Corporation, East Japan Railway Company, KYOCERA Corporation, The Bank of Tokyo-Mitsubishi UFJ, Ltd. and others.

**Coverage**
UQ Communications has revised its WiMAX base station installation plan for the 2009 fiscal year from 4,000 to more than 6,000 base stations by the end of March 2010 covering 55 percent of Japan’s population with the commitment to provide WiMAX coverage to 90 percent by 2013. UQ is now providing WiMAX services in 45 Prefectures and 330 municipalities across Japan.

**Services and customers**
The highest speed UQ WiMAX can suggest is 40 Mbit/s down and 7.2 Mbit/s up.

The hardware provided by UQ WiMAX is:
- Wimax WIFI Gateway
- UQ WiMAX Data Communication Cards

The pricing structure is as follows:
- **"UQ Step"**: Two-tiered pricing structure. Meets user needs where frequency or volume of use varies month to month.
- **"UQ Flat"**: Flat fixed rate.

UQ focuses on notebook, netbook, and Mobile Internet Devices (MID). **The business model is open**, where any manufacturer can provide a variety of WiMAX devices.

UQ is the only telecommunications company in Japan that provides nationwide mobile services based on the WiMAX global technology standard.
Success stories: Russia

The company

Established in 2008, Yota is the first Russian mobile WiMAX network, Yota launched commercial operations in June 2009. It extends across Moscow, St. Petersburg and Ufa. The network operates under IEEE 802.16e-2005 with very high frequency 2.5-2.7 GHz.

Additionally, Yota has recently started deploying WiMAX in Nicaragua. The commercial launch is scheduled on mid-2010.

Coverage

Net coverage in Moscow, St. Petersburg and Ufa is now over 90%. In Sochi and Krasnodar the network is running in testing mode.

In Nicaragua, most of the city of Managua is covered.

Services and customers

WiMAX delivers up to 10 Mbps access at any time within the coverage area.

Yota provides to its customers connectivity plus value added services such as music, VoD and DVB-H TV. In order to connect to the Yota network, a Mobile WiMAX device is needed, it can be a notebook, a USB modem, an Express card, a Mobile WiMAX/WiFi Center, an HTC MAX 4G phone or a Yota Egg.

Yota offers three monthly service plans:

• **Yota Mini**, which offers unlimited internet

• **Yota MAX**, which offers unlimited internet plus VoD and DVB-H TV. Exclusively with HTC MAX 4G.

• **Yota day**: Special plan for one day connections, during which you can access all Yota contents.

At the end of 2009 Yota reached the operational break-even point raising over 200,000 customers.

As Yota announced recently, It has begun operations in Peru.
4. Methodology for valuing spectrum
Methodology for valuing spectrum: Definition of the different scenarios

• Estimating the future demand for services on mobile devices is the first step in assessing the spectrum. With this information we can make a good estimate of the network capacity requirements that an operator requires to provide the telecom service in an efficient way so that the sunk costs are minimized.

• As an example, a scenario that includes a strong demand for mobile services, involves the allocation of more frequency blocks since it is necessary to meet the significant bandwidth that users require.

• This phase defines three possible scenarios depending on the level of demand of mobile services.

• This classification is done depending on the analysis of the following variables:
  - User behavior
  - Technology
  - Business Strategies
  - Datacards/Handsets

<table>
<thead>
<tr>
<th>TREND</th>
<th>SCENARIO 1: “MOBILE MAKES HEADWAY”</th>
<th>SCENARIO 2: “MOBILE BROADBAND TAKES-OFF”</th>
<th>SCENARIO 3: “BROADBAND IS MOBILE”</th>
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<tbody>
<tr>
<td>Consumer behaviour</td>
<td>Supplementary mobile broadband usage ‘on the go’ and as main connection for mobile households</td>
<td>Complementary mobile broadband usage which takes advantage of ‘always on, always there’ access</td>
<td>Substitutional mobile broadband usage because convenience drives fixed-mobile substitution</td>
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<td>Technology</td>
<td>Peak speeds improve</td>
<td>Peak speeds improve</td>
<td>Peak speeds improve dramatically through LTE technologies</td>
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<td>Commercial decision-making</td>
<td>Tariffs remain on per MB basis in the short term, before moving to bundles</td>
<td>Alternatives gradually converge with mobile handsets</td>
<td>Alternatives converge with mobile handsets</td>
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<td>Datacards</td>
<td>Penetration of datacards driven by ubiquity of device installed on portable equipment and laptops</td>
<td>Mobile datacards take significant amount of usage from fixed broadband</td>
<td>Mobile datacards take significant amount of usage from fixed broadband</td>
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<td></td>
<td>Fixed broadband continues to be a major access point for home and business usage</td>
<td>Datacards become sole access point for significant minority of households</td>
<td>Datacards and handsets converge and become dominant access point for majority</td>
</tr>
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<td></td>
<td>Fixed lines used for IPTV and business</td>
<td>Fixed lines used for IPTV and dedicated business services</td>
<td>Fixed lines used for IPTV and dedicated business services</td>
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</table>
• For each of the scenarios defined in the first phase is estimated the future demand.
• The demand analysis is based on three pillars: the volume of network traffic (voice and data) access devices and average usage of the network.

To obtain an estimate of the data related to the pillars above, it should be analyzed different sources of information to get a result as objective as possible.
Finally, once calculated the demand that will bear the future network operator, it is designed the necessary network structure (including expected growth) and also the investment requirements in terms of CAPEX & OPEX.

The design of the future network will depend on variables as:

- Technology
- Coverage
- Network capacity
- Spectrum
- Market situation
- Regulatory policy
Methodology for valuing spectrum: *Spectrum valuation*

Using the 5.8 GHz band would mean 12 times more investment than in the 700 MHz band for the same coverage conditions.

The frequency band becomes an exogenous factor which has a direct impact on the CAPEX. This effect has provoked that in some countries asymmetric MTR has been reckoned.
5. Recommendations
Recommendations

1. **Geographic scope** is becoming a major issue in the definition and implementation of the regulatory policy.

2. There is a **transformation in the access network** where not only ULL and bitstream are alternatives of access, but also the mobile network is becoming an alternative.

3. National Regulatory Agencies have to open the debate between a **service based competition vs infrastructure based competition**.

4. **Population density, sociodemographic and economic conditions** makes WiMAX an alternative for the provision of voice and broadband services.

5. **Spectrum valuation** is a major issue. Methodologies for estimating this value requires identifying different scenarios, estimating demand and eventually determine the network requirements to provide the services.

6. Depending on the frequency band the **CAPEX could be up to 12 times greater**. The licensing process will be a key issue since it will be the first approach for regulation. Precisely since the allocation is exogenous, it could be a reason used by the Mobile Network Operators (MNOs) to request asymmetric MTR
Antonio García Zaballos

Antonio García Zaballos is PhD in Economics at Universidad Carlos III de Madrid. Currently he is senior advisor to the Global ICT Department of the World Bank and expert to the International Telecommunications Union (ITU).

Dr. García Zaballos was Head of the Cabinet for Economic Studies and Regulation (GEER), and was also Deputy Director at CMT, the Spanish telecoms regulator, where among others he was responsible for market analysis and economic issues applied to the estimation of the cost of Universal Service Obligations (USO), Fixed-Mobile convergence, regulatory policy applied to bundling, regulatory policy applied to retail and wholesale services and auditory of cost accounting models. He has a broad experience in economic consulting applied to the telecom sector in countries as: Saudi Arabia, Dominican Republic, Guatemala, Costa Rica, Argentina, Latvia, Bulgaria, Poland and Albania.

Additionally, Dr. García Zaballos is a professor at Instituto de Empresa Business School and University Carlos III in Madrid, where he teaches telecoms economics and applied finance at the Global MBA and the Master in Industrial Economics.
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