

“A step closer to next generation
mobile services”

Regulatory Perspectives for Mexico

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I. IMPORTANCE OF WIRELESS NETWORKS FOR BROADBAND PENETRATION

I. Importance of Wireless Networks for Broadband Penetration

- Compared to wired technologies, wireless technologies do not require digging trenches and getting rights of way to install a physical connection to end-users, enabling operators to reduce fixed costs and time for network deployment.
- These savings may be significant if we consider that civil engineering costs in a wired network, including trenches, ducts, posts, cable, and rights of way, represent 30% to 80% of the network's capital expenditures.
- According to Raghunathan (2005), the cost per user in a wired network can reach three times the cost per user in a wireless network.*
- Additionally, wireless technologies offer mobility.



Spectrum is the main input for wireless networks.
Therefore making spectrum available becomes a key policy.

* See European Regulatory Group (2007), p.17; Office of Communications (2008), p.40; and OCDE (2008), p.20.

I. The importance of allocating enough spectrum for the deployment of new wireless networks

- Allocating spectrum may promote competition in the telecommunications market, as it allows new competitors to get a hold of this valuable resource.
- In highly concentrated markets, incumbents do not have incentives to rapidly adopt technological improvements, as they seek to avoid the depreciation of their investments.
- New competitors can trigger technological development by two mechanisms:
 - 1) As they do not have historical investments, they have the choice to introduce new technologies in the deployment of their networks.
 - 2) Their presence puts pressure on incumbents to accelerate the adoption of technological improvements because otherwise they could lose market share.

I. The importance of allocating enough spectrum for the deployment of new wireless networks

- When roaming agreements are not available, a successful entry requires that the new operator reaches wide network coverage that allows him to position himself in the market.
- In order to have a fast and wide deployment of a new network, entrants need access to large amounts of capital. This may result in a significant financial pressure, thus translating in a market entry barrier.
- The trade-off that exists between capital expenditures to deploy a physical network and spectrum bandwidth availability, makes spectrum allocation a key ingredient in making new entrants' projects viable.



Allowing the accumulation of spectrum holdings by new entrants has been a useful tool to increase competition in telecommunications markets.*

*Examples are the authorization of the Sprint-Nextel and ClearWire merger in the United States for the development of a new national broadband network based on WiMAX technology in the 2.5 GHz band, and the authorization by the Federal Competition Commission in Mexico of the various spectrum acquisitions by Nextel Mexico in the trunking frequency bands.

II. SPECTRUM BANDS ALLOCATED IN MEXICO FOR MOBILE AND FIXED SERVICES

II. Spectrum Bands Allocated in Mexico for Mobile and Fixed Services

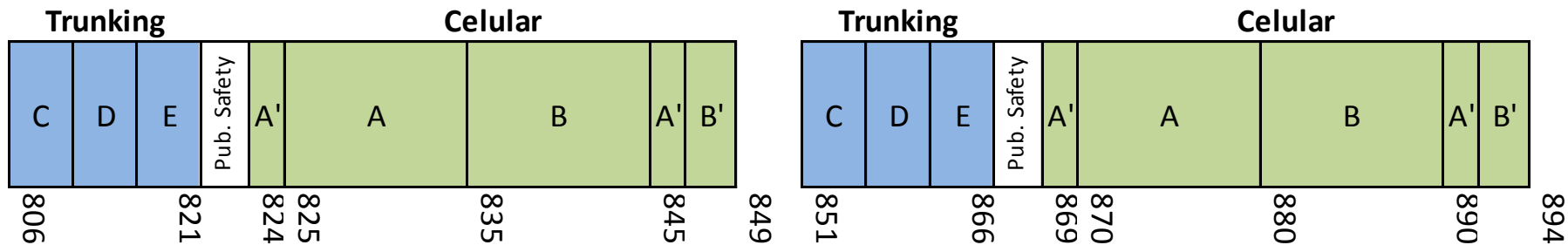
	Spectrum Bands:	MHz
Mobile Services	<ul style="list-style-type: none">• 800 MHz• 1.9 GHz (PCS)• 1.7-2.1 GHz (AWS)	80 120 60 <hr/> 260
Fixed Services	<ul style="list-style-type: none">• 3.5 GHz	150
Unlicensed Bands	<ul style="list-style-type: none">• So called “Free use spectrum”.• 900 MHz, WiFi, DECT, 5 GHz and 5.8 GHz.	444.5

II. Spectrum Allocated in Mexico to Mobile Services

800 MHz Band

- This band is allocated to trunking and cellular network licensees.

800 MHz Band Plan



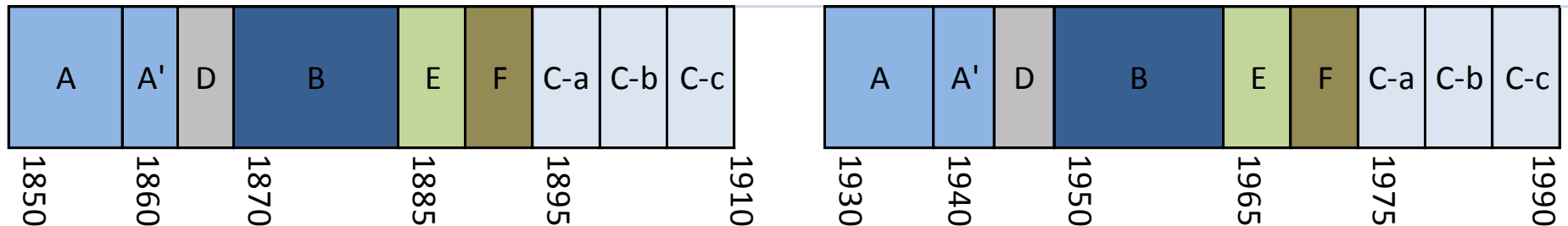
Trunking		Cellular	
Regions	Blocks C,D & E	Blocks A & A'	Blocks B & B'
1-4	Nextel	Telefonica	Telcel
5-9	(20 MHz average)	Iusacell	

II. Spectrum Allocated in Mexico to Mobile Services

1.9 GHz Band (PCS)

- The 120 MHz of this band were allocated in three auctions (1998, 2005 & 2010).
- Recurrent yearly payments were set in this band for the 2005 auction (aprox. USD\$ 25 million for a 10 MHz per year).
- Recurrent payments were maintained in the 2010 auction.

PCS Band Plan



II. Spectrum Allocated in Mexico to Mobile Services

Spectrum Allocation in the PCS Band

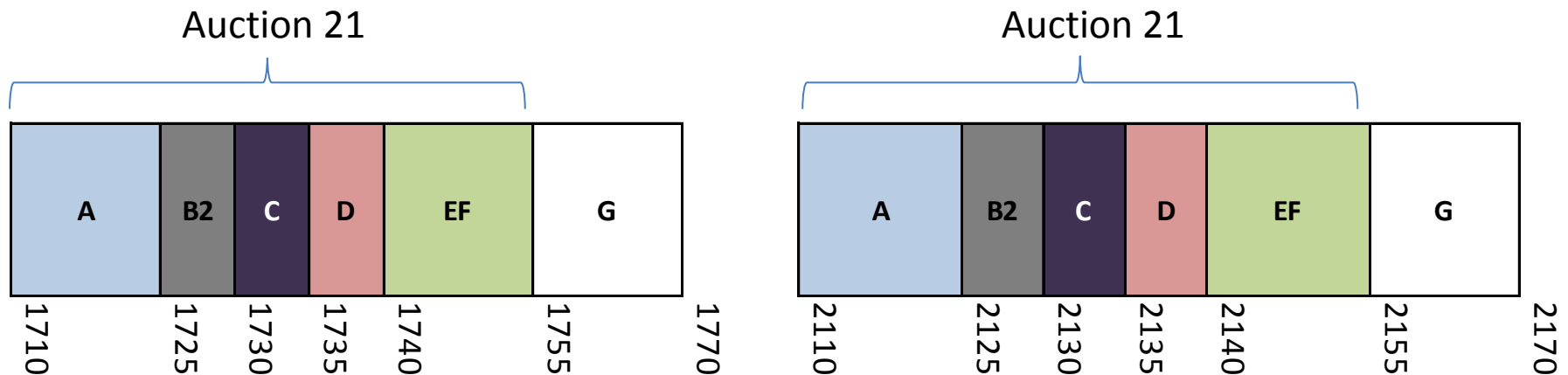
REGION	A* (21.6)	A' (8.4)	D (10)	B1 (10)	B2 (10)	B3 (10)	E (10)	F (10)	C-a (10)	C-b (10)	C-c (10)
1	IUSA	TELCEL		TM			IUSA	TELCEL	IUSA	TM	IUSA
2							TM		IUSA	IUSA	IUSA
3				IUSA	TM	TM	TM		TM		IUSA
4				TM			IUSA		TM	NEXT	IUSA
5				IUSA	TM	TM	TM		TM		IUSA
6				TM			TM		IUSA	TM	IUSA
7				IUSA	TM	TM	TM		TM		IUSA
8				HERMES					IUSA		
9				TM			TM		TM	TM	TM

II. Spectrum Allocated in Mexico to Mobile Services

1.7-2.1 GHz Band (AWS)

- 60 MHz were allocated in August 2010 (Auction 21).
- 60 MHz remain vacant (Blocks A & G).
- Band licensees will start paying PCS annual fees in 2012.

AWS Band Plan



II. Spectrum Allocated in Mexico to Mobile Services

Spectrum Allocation in the AWS Band (Auction 21)

REGION	A (30 MHz)	B2 (10 MHz)	C (10 MHz)	D (10 MHz)	EF (30 MHz)
1	VACANT	TELCEL	TELCEL	TELCEL	NEXTEL
2		TELCEL	TELCEL	TM	
3		TELCEL	TELCEL	TM	
4		TELCEL	TELCEL	TM	
5		TELCEL	TELCEL	TELCEL	
6		TELCEL	TELCEL	TM	
7		TELCEL	TELCEL	TM	
8		TELCEL	TELCEL	TELCEL	
9		TELCEL	TELCEL	TM	

II. Spectrum Allocated in Mexico to Mobile Services

Spectrum Value in Auctions 20 and 21

Discount Rate of 10% and 20 years license term

		Auction 20*	Auction 21	
		A	B	C
Band		1.9 GHz	1.7/2.1 GHz	1.7/2.1 GHz
Bandwidth		3 x 10MHz 30 MHz Value	3 x 10MHz 30 MHz Value	1 x 30MHz 30 MHz Value
Initial Payment	a	\$3,075,710,202	\$5,067,749,000	\$180,300,000
PV of Annual Fees	b	\$8,126,705,873	\$6,930,344,881	\$6,930,344,881
Total Value	c=a+b	\$11,202,416,074	\$11,998,093,881	\$7,110,644,881
	a/b	37.85%	73.12%	2.60%
	a/c	27.46%	42.24%	2.54%

*Auction 20 did not include spectrum in region 8. To make the values of both auctions comparable, the spectrum value of auction 20 was adjusted by the percentage that region 8 represented in the total value of the regional blocks in auction 21.

II. Spectrum Allocated in Mexico to Mobile Services

Spectrum Holdings Mobile Operators

Operator	R 1	R 2	R 3	R 4	R 5	R 6	R 7	R 8	R 9
Telcel	78.4	68.4	73.3	73.3	78.4	73.3	68.4	78.4	73.3
Telefónica	60	70	80	71.9	50	60	60	30	70
Iusacell-Unefón	51.6	51.6	41.6	41.6	61.6	66.6	61.6	51.6	56.6
Nextel	39.3	48.4	47.4	54.7	51.4	49.2	51.5	51.5	50
TOTAL	229.3	238.4	242.3	241.5	241.4	249.1	241.5	211.5	249.9

II. Spectrum Allocated in Mexico to Mobile Services

Mobile Market Indicators

	Subscribers	Postpaid Subscribers	Service Revenues	EBITDA	Population Coverage
Telcel	70.8%	49.9%	66.2%	78.4%	96%**
Telefónica	21.1%	10.3%	14.2%	10.6%	88%**
Iusacell	4.4%	11.9%	5.9%	1.4%	67%**
Nextel	3.7%	27.9%	13.7%	9.6%	67%***

*As a percentage of the population covered.

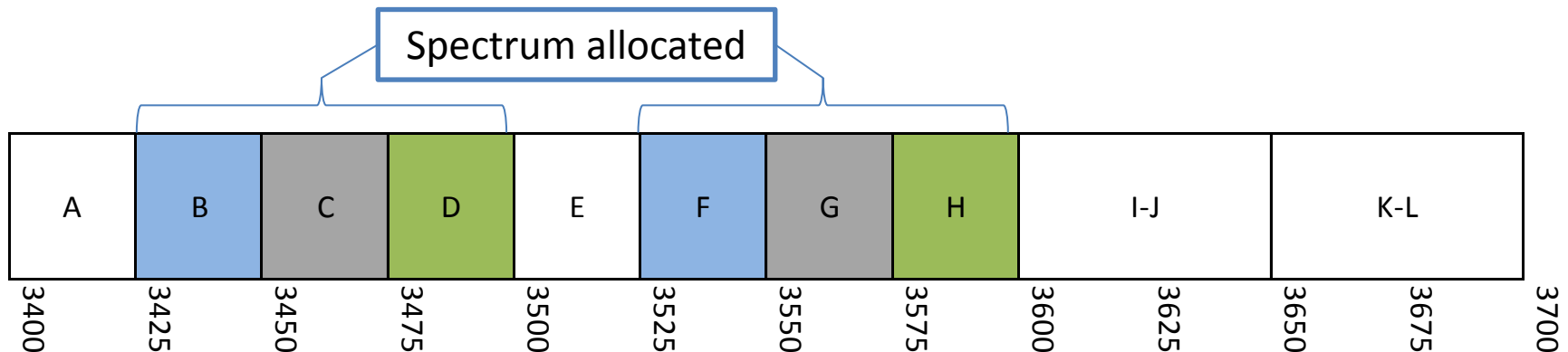
Source: Merrill Lynch, Global Wireless Matrix 3Q10, sept 2010; **Resolución del Pleno de la Comisión Federal de Competencia DC-08-2007 respecto a la existencia de poder sustancial en el mercado de servicios de telefonía móvil (enero de 2010); ***Reporte Anual 2009 de NII Holdings, <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9NDY2MTd8Q2hpbGRJR0tMXxUeXBIPtM=&t=1>

II. Spectrum Allocated in Mexico to Fixed Services

3.5 GHz Band

- 150 MHz were auctioned in 1998.
- Axtel is the only licensee in the band that actually uses the spectrum.

3.5 GHz Band Plan



Block	B	C	D
Nationwide coverage	Axtel	Telmex	Nextel

II. Unlicensed Bands: So called “Free-Use Spectrum”

- 900 MHz Band (902 – 928 MHz)
- DECT (1920 – 1930 MHz)
- WiFi (2400 – 2483.5 MHz)
- 5 GHz Band (5150 – 5350 MHz)
- 5.8 GHz Band (5725 – 5850 MHz)

III. NEAR FUTURE SPECTRUM AUCTIONS IN MEXICO

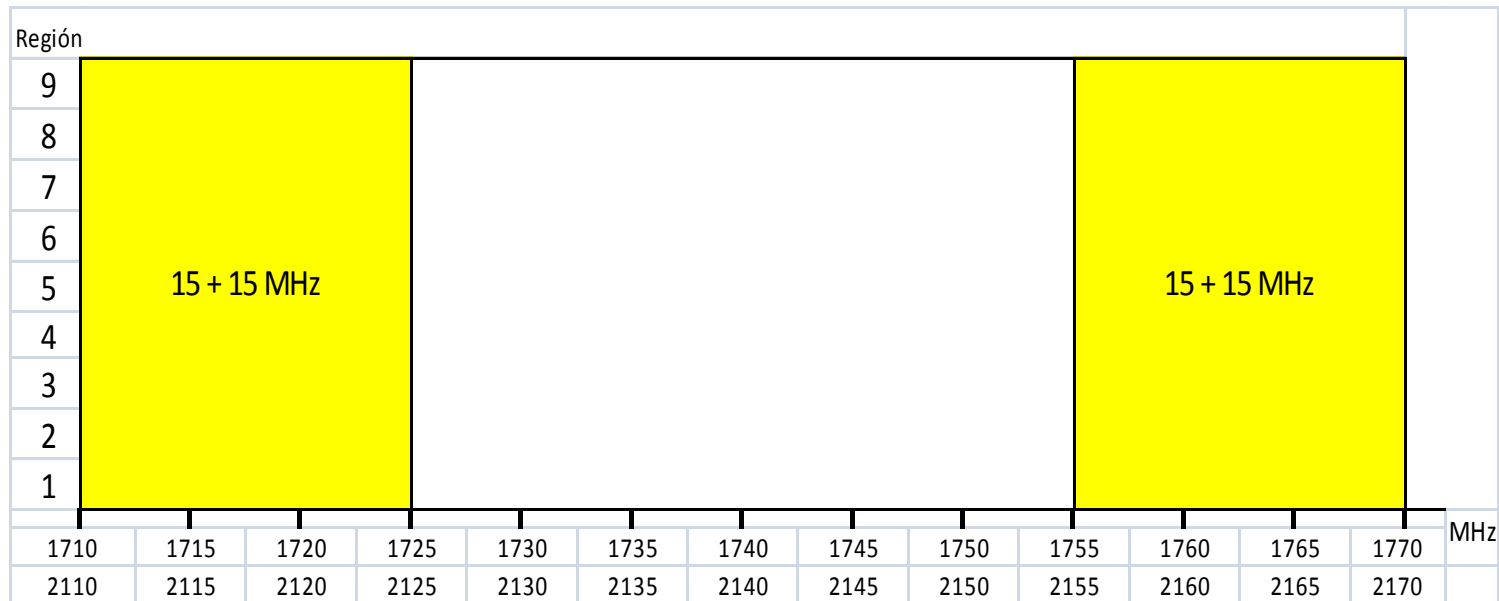
III. Near Future Spectrum Auctions

- Future Spectrum Auctions in Mexico (2011-2012):
 - Remaining spectrum in the AWS band (60 MHz)
 - 3.5 GHz band (150 MHz)
 - 700 MHz band (90 MHz)
- On November, 8 of this year, a public consultation for the auction of these bands was published in Cofetel's website.

III. Near Future Spectrum Auctions: 1.7-2.1 GHz Band

- A possibility exists to extend this band to 1780 MHz.

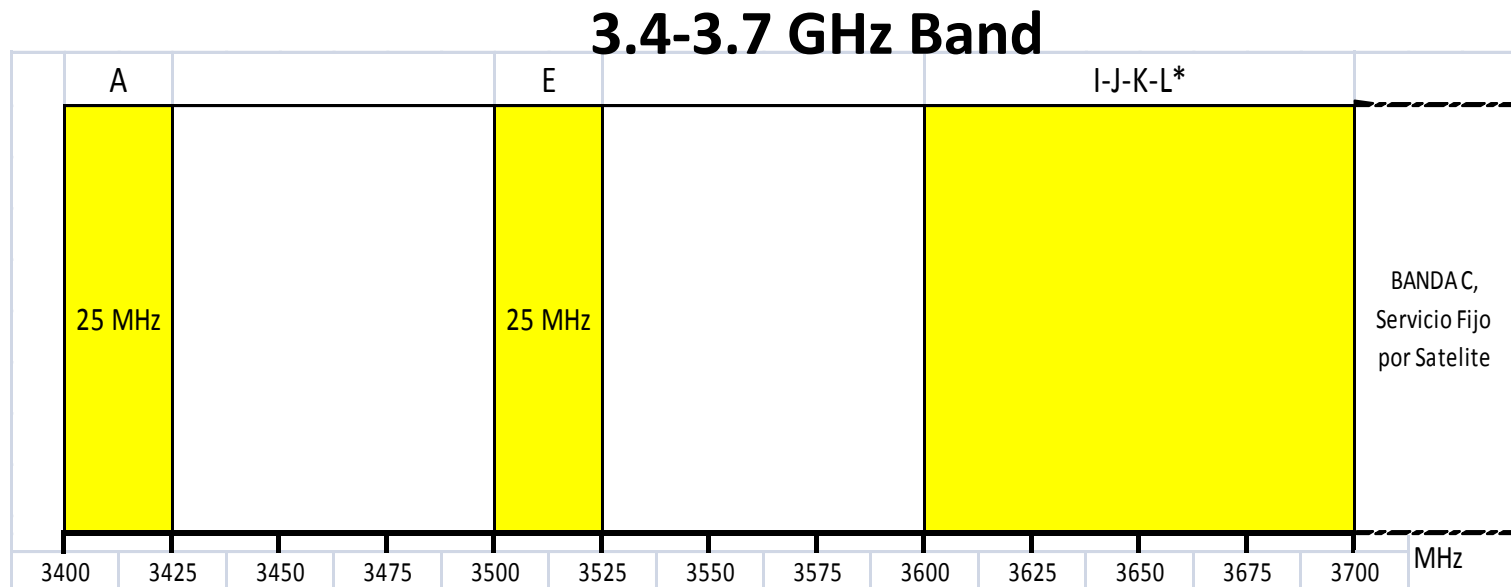
1.7-2.1 GHz Band



Available Spectrum
 Spectrum that is already in use

III. Near Future Spectrum Auctions: 3.4-3.7 GHz band

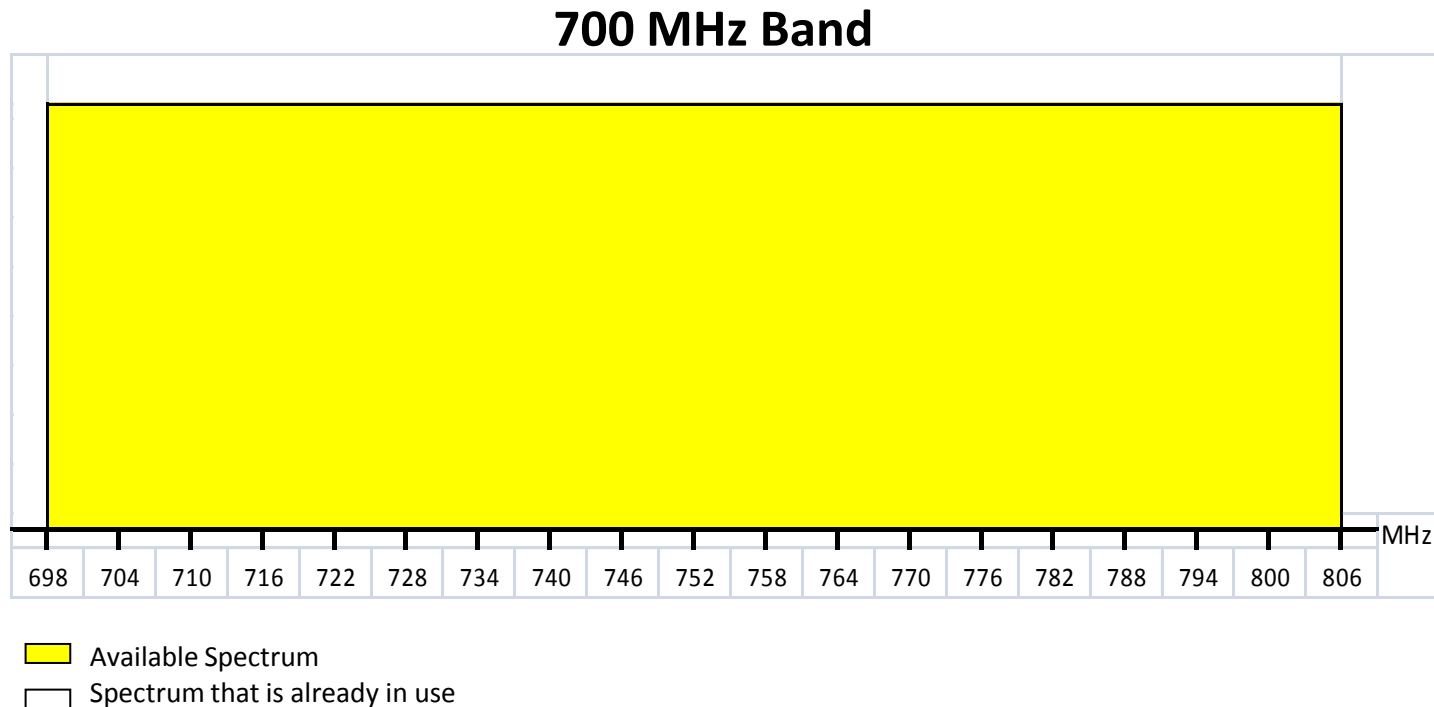
- The remaining 150 MHz in this band are planned to be auctioned in 2011 with the remaining spectrum in AWS Band.
- Two 25 MHz blocks with regional coverage (country divided in 9 regions) and two 50 MHz blocks with smaller geographic coverage to be defined.



■ Available Spectrum
□ Spectrum that is already in use

III. Near Future Spectrum Auctions: 700 MHz band

- The TV analogue switchover starts in 2011 and will end in 2015.*



*Note: This timeline is subject to a favorable resolution in the Supreme Court of Justice regarding the constitutional controversy placed by Congress against the presidential decision of the analogue switchover.

IV. DIAGNOSIS: WHERE WE STAND IN BROADBAND

IV. Diagnosis: Where we stand in BB

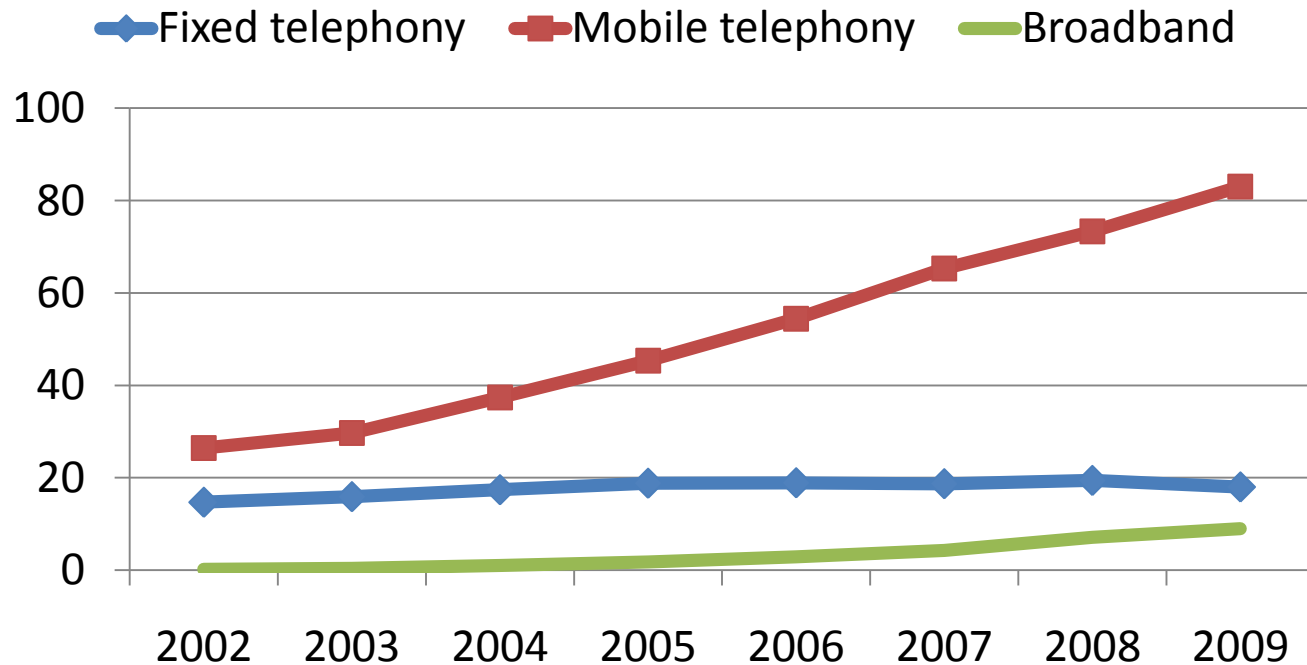
- In Mexico 260 MHz have been allocated to mobile services.
- In the next 2 years, 150 MHz can be made available for mobile services with the auctioning of the 700 MHz band and the remaining spectrum in the AWS band; however, it may not be enough to meet the expected bandwidth demand.
- According to the ITU*, in order to meet demand for mobile broadband services in the year 2010, countries will need over 760 MHz of spectrum, and 1280 MHz in the year 2020.

*ITU (2006), "Estimated Spectrum bandwidth requirements for the future development of IMT-2000 and IMT-Advanced", Report ITU-R M.2078

IV. Diagnosis: Where we stand in BB

- Broadband deployment and take-up is still incipient.

Evolution of the telecommunications penetration in Mexico
(lines /subscribers per 100 inhabitants)

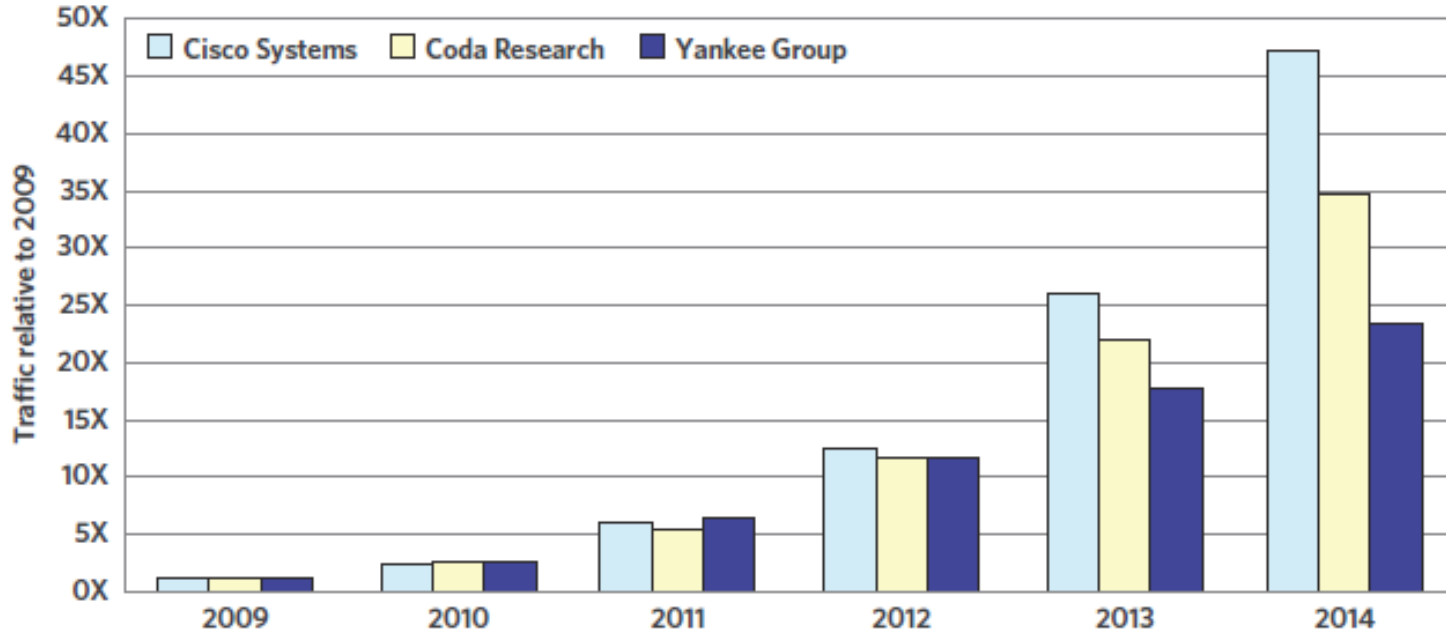


IV. Diagnosis: Where we stand in BB

- The broadband market in Mexico: Telmex has 72% of market participation, while cable companies hold 21%. Mexico has not implemented Local Loop Unbundling.
- Most of Mexico's population has access to at most one broadband vendor.
- An accelerated surge in the demand of data/bandwidth generated by the users of smart phones and computers has started to limit the capacity of the existing mobile wireless networks.

IV. The Exponential Growth of Traffic Data

Forecasted Mobile Traffic Data in North America



Source: Chapter 5, The National Broadband Plan, FCC 2010

IV. What are the Government goals to achieve Universal Broadband Access?

- One of the main goals of the current Administration is to make broadband access available and affordable to every Mexican.
- The National Development Plan established a goal of 22% of penetration broadband by the year 2012.
- However, under the current trend of broadband penetration, that goal will not be able to be attained (as 10.9% penetration is estimated to be reached in 2011, if the current trend persists*).

IV. Legislative Initiative to include Broadband as a Constitutional Right

- June 30th 2010, Senator Sotelo proposed a constitutional amendment to guarantee universal broadband access as a fundamental human right.
- Among the reasons for this amendment he states the following:
 - ICTs constitute one of the main challenges of our society, as they represent a revolution in the same scale as the industrial revolution did centuries ago.
 - The access to ICTs, and particularly, broadband, are vital elements for the development of society and our modern economy, since they provide important spillovers in productivity and social inclusion.
 - ICTs offer citizens new forms of expression, as well as a mean to participate in political and social life.

V. CASE STUDY: THE 2.5 GHZ BAND

V. There is the possibility of deploying a New Open Network

- WiMAX or LTE make possible the delivery of mobile broadband at a competitive cost compared to fixed networks.
- The significant advantage of wireless technologies is that the cost and timing of the deployment is much less than in the case of fixed networks, which allows for a greater coverage.
- There are various alternatives of frequency bands for the development of the network:
 - The 700 MHz band
 - The 1.7 and 2.1 GHz (also named AWS).
 - The 2.3 GHz and 2.5 GHz for mobile broadband services.
 - 3.5 GHz band for fixed voice and data services

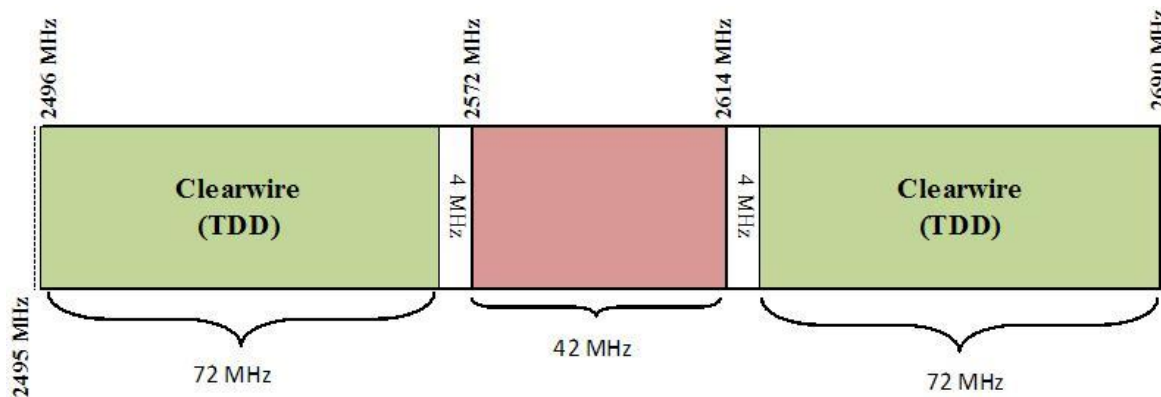
V. Advantages of using the 2.5 GHz band for the deployment of an Open Network in Mexico

- This band was initially allocated to MMDS services.
- Licensees in this band have been migrating to new technologies (Fixed WiMAX).
- The band has sufficient spectrum (190 MHz) so that a new competitive mobile broadband network can be deployed.
- The government is in process of renewing licenses of this band with the aim of promoting the adoption of next generation technologies.
- It has been already allocated in the United States and Canada for the deployment of mobile broadband networks, therefore:
 - Roaming services could be provided between Mexico and these countries.
 - Mexico could leverage from the economies of scales in the production of equipment and devices in these two countries.

V. 2.5 GHz Band in the U.S.

- Most of the 2.5 GHz band is allocated to a single operator. FCC authorized in November 2008 the Clearwire and Sprint-Nextel merger.
- FCC stated that the merger had the potential of fostering competition by enabling a new competitor to enter the telephony and broadband market.

Current Status of the 2.5 GHz Band in the US.*



*This chart shows, in general terms, the current status of the band in the US as the spectrum that Clearwire holds throughout the whole country is not homogeneous.

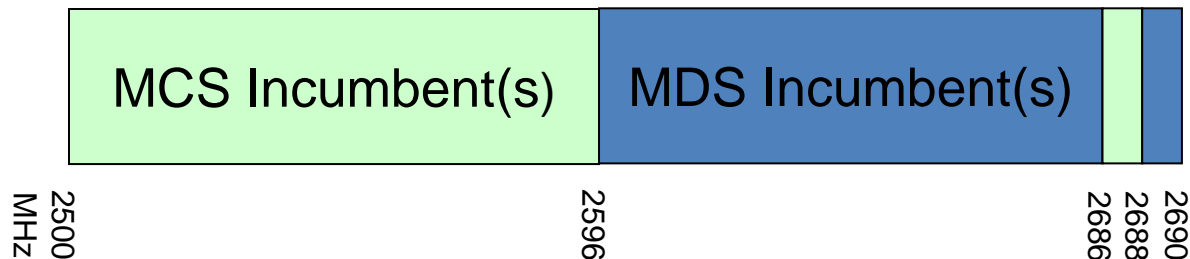
Source: Own elaboration based on information by the Federal Communications Commission (<http://wireless.fcc.gov/services/brsebs/data/BRS-EBS-BandPlans.pdf>) and operators.

V. 2.5 GHz Band in Canada

- The 2006 Policy for band 2500-2690 MHz to Facilitate Future Mobile Service
 - Canada acknowledged requests for flexible licensing approach to allow implementation of new services
 - Incumbents were given the voluntary options to obtain mobile licenses in exchange for the return of 1/3 of their spectrum:
 - 2535-2568 Mhz (33 Mhz)
 - 2657-2690 MHz (33 MHz)

} Bands to be returned

Current Canadian band plan



V. ITU Recommendation for the 2.5 GHz Band

6.1.4.3 Banda 2 500-2 690 Mhz					
MHz	2 500	2 550	2 600	2 650	2 690
C1					
	2 500	2 570	2 620	2 690	
C2					
	2 500	2 570	2 620	2 690	
C3	DDF/DDT flexible				
	2 500				2 690

Source: ITU (2007), Rec. UIT-R M.1036-3

V. Proposal of development of the New Open Network in the 2.5 GHz band

- Deployment of a new broadband network using the 2.5 GHz spectrum, capable of competing effectively.
- Establishment of specific coverage milestones and ambitious plan that covers both urban and rural areas.
- Ensure that this network should be open to allow users to access any kind of content application, service or devices, according to open standards and specifications; while offering telephony independently of broadband services.
- Alignment of incentives in order to balance the public policy goal of extending coverage to underserved areas, but keeping in mind the financial viability of the project.

V. Pillars of the Proposal: Development of a New Open Network in the 2.5 GHz Band

- A. Competition
- B. Coverage
- C. Open Network

V. Pillars of the Proposal: New Open Network in the 2.5 GHz Band

A. Competition

- The new network must be able to compete with incumbent mobile operators. It is therefore fundamental to avoid that the incumbent participates in the operation and financing of the new network.
- If the spectrum is licensed to existing mobile operators, it may be possible that these may seek to lock the deployment, in order to delay the entry of new competitors.

V. Pillars of the Proposal: New Open Network in the 2.5 GHz Band

B. Coverage

- For the deployment of a new broadband network, specific coverage commitments ought to be established through location selection criteria that the license holder should comply with, as part of the licenses' terms and conditions.
- Coverage obligations under the current licensing scheme contemplate a percentage of the population in specific localities. As these are generic obligations, they generate incentives to cover only the most densely populated localities, to the disadvantage of underserved- rural communities

V. Pillars of the Proposal:

New Open Network in the 2.5 GHz Band

C. Open Network

- **Unrestricted access to content and applications (Net Neutrality).** Users should enjoy of unrestricted access to any kind of content application or service that may be available through the network.
- **Open terminal equipments.** The network should allow users to connect to any kind of equipment or device that does not represent a hazard to the network, and any third party may develop terminal equipments for this network.
- **Open network components.** Patents associated to the equipment and technologies used by the network should be made available to third parties in a predictable manner. Example: A Nokia cell should be interoperable with a Samsung terminal device.
- **Open Applications.** Any third party may develop applications for terminal equipments of the network.

V. Pillars of the Proposal: New Open Network in the 2.5 GHz band

Importance of an Open Network: Key Landline Network Regulations

- Innovation and development of the ICT sector and, in particular, of the Internet is closely related to the possibility of:
 - 1) using any kind of terminal device that does not damage the network (first adopted in the late 60's in the United States), and
 - 2) accessing any kind of service, content and application through existing landline networks (first adopted in the early 80's in the United States).

V. Pillars of the Proposal: New Open Network in the 2.5 GHz Band

Historical Precedents of Open Networks

- The policy that allowed costumers to connect any terminal equipment that complied with technical requirements to the landline telephone network incented the development of answering machines, faxes and eventually of modems for Internet. (The Carterfone Case in the U.S.)
- The policy that allowed the use of the landline telephone network by independent InternetServices Providers without a special charge opened existing landline networks to any kind of service, content and application provided through Internet.

V. Open Network Proposal in the 2.5 Ghz Band: Key Participants of the Project

- **Current license holders** of the 2.5 GHz band: the participation consists of the use of their current licenses in this band, and other use of the infrastructure that may be used in installation of the network.
- **Potential investors:** they would finance the project through capital as well as through infrastructure that could be used for the deployment of the network, as is the case of optic fiber antenna towers and sites.

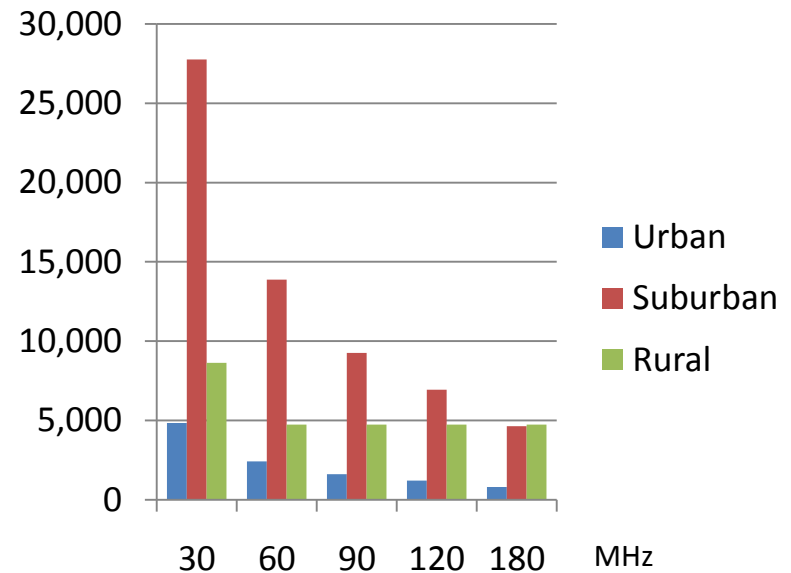
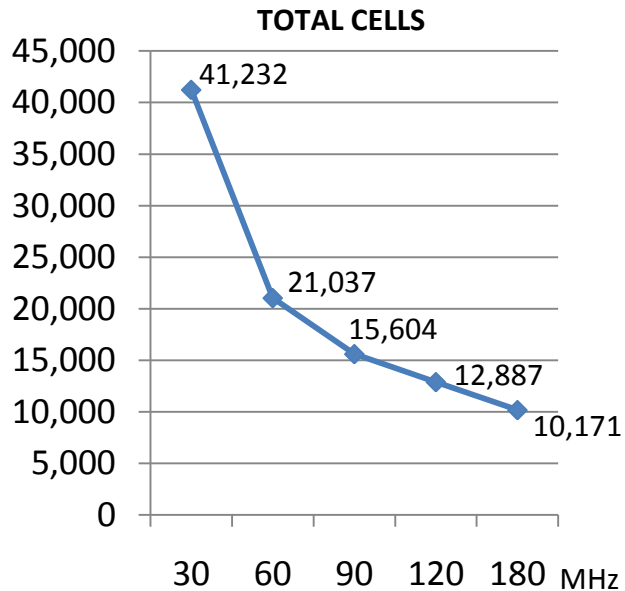
V. Cost advantages of the 2.5 GHz band

- Since the 2.5 GHz has 190 MHz of spectrum available to migrate to next generation networks, there is a significant cost reduction caused by the availability of spectrum.
- The wider the spectrum bandwidth available, the less number of base stations required to meet a given traffic demand; and hence, the lower the network's operational and capital expenditures.

V. Cost advantages of the 2.5 GHz band

Spectrum bandwidth vs. Capital and Operational Expenditures

*Base stations required given the spectrum bandwidth available**



*Telcel currently has more than 10,000 radiobases installed.

Source: Own elaboration.

VI. LTE AND WIMAX

VI. LTE and WiMAX

- The development of WiMAX introduced important technological innovations in wireless technologies, such as the use of the IP protocol, new frequencies modulation techniques, and the transmission and reception of signals within the same frequency channel.
- LTE was the answer by existing cellular operators and equipment providers to WiMAX; as it incorporates many of its innovations such as the IP protocol and the OFDM frequency modulation technique.
- For such reason, no significant differences are expected between WiMAX and LTE in terms of the speeds that can be offered to end-users.

VI. Main difference between WiMAX and LTE

Where a big difference is expected between WiMAX and LTE is in the type of business model that network operators will adopt.

- WiMAX has been adopted by new entrants whose business models are characterized by offering unlimited access to contents and services available in the internet (net neutrality).
- On the other hand, LTE has been backed up by cellular operators and incumbents with traditional business models.
- LTE will probably enjoy larger scale economies, as cellular operators are backing up the development and adoption of this technology.
- Even though both technologies (LTE or WiMAX) could foster open networks, a concern exists that since operators who are adopting LTE are keeping current business models, they may incur in certain commercial practices such as limitations to access to applications and services that may result in a closed network.

VI. The technology and service neutrality as a principle guiding spectrum management

- No specific technology should be mandated for the use of any band.
- The National Regulatory Authority does not favor the implementation of one technology over another one (LTE or WiMAX)
- However, the Regulator should stress the importance of Open Networks (in all the dimensions this concept may cover).