

# **ITUs Role in Shaping the Future Wireless Ecosystem: High-Level Session**

WSIS Forum  
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Commissioner

# Mexico(s)

- 120 million people in 32 States
- Mexico City with 22 million people
- Low density states in places such as Baja California Sur with 637,026 inhabitants
- Telecom GDP grew 4 times more than national GDP



# Mexico(s)

- **22% Rural population scattered in more than 185,000 locations**
- **Significant socio-economic inequalities: on average urban households have income 7.6 times larger than rural households**
- **61% mobile broadband penetration nationally**



# Principles for Spectrum management in Mexico

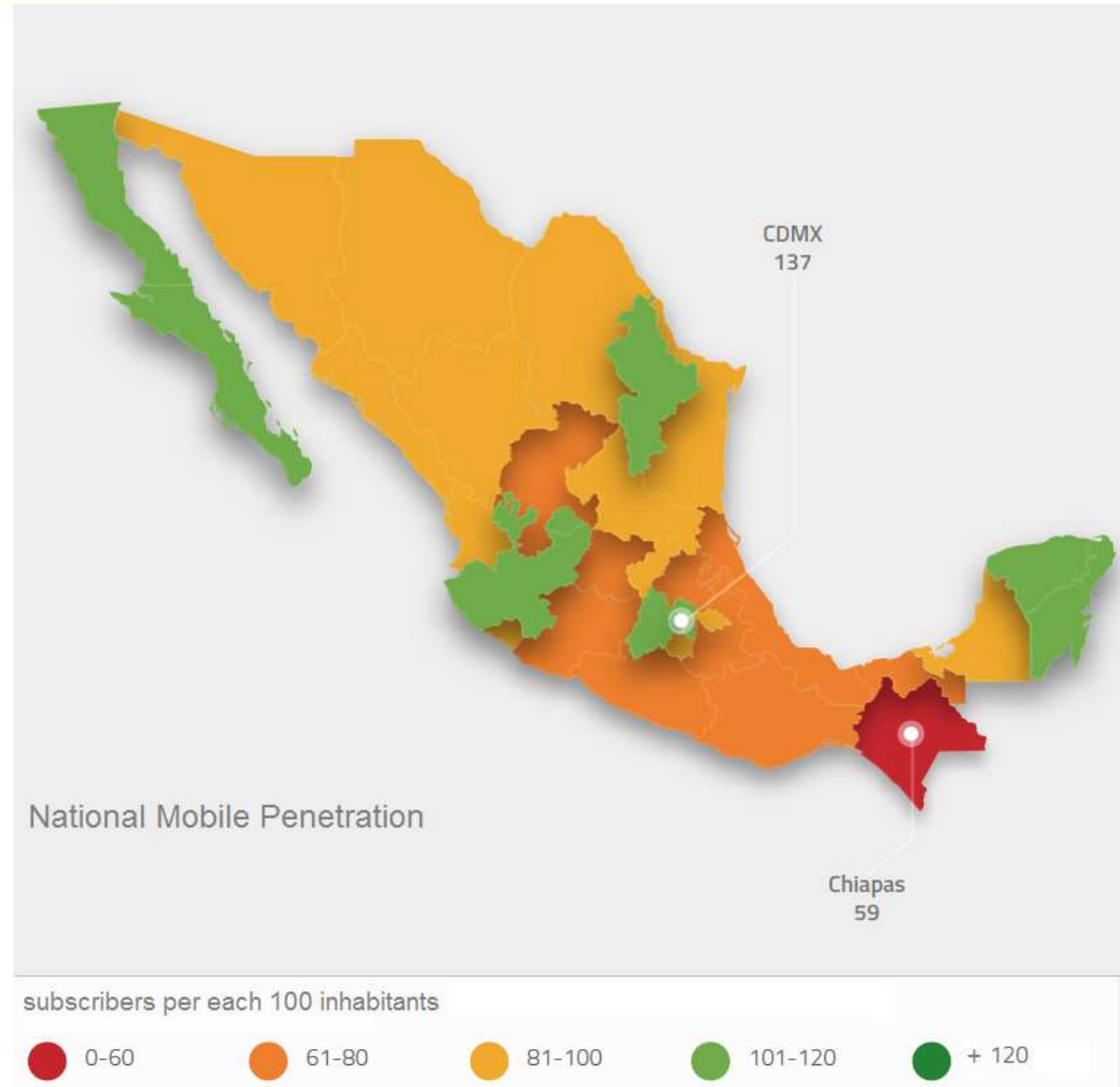
- **There are commercial, public, private and social (community and indigenous) uses of spectrum.**
- **Commercial and private licenses on a primary basis must be assigned through a bidding process. 20 yr licenses.**
- **IFT annually publishes a radiofrequencies licensing program for all uses based on petitions & availability.**
- **Public and social licenses are granted based on availability, merits of the proposal, etc. Federal government has preference over state entities for spectrum, it does pay fees.**
- **Public and social don't pay for license but annual fees for use except in broadcasting**
- **Experimental, amateur radio although private use, is not allocated thru bids.**
- **Winner of a bidding procedure is not determined exclusively by highest bid, other non-monetary criteria apply too.**

# National Fibre Optic

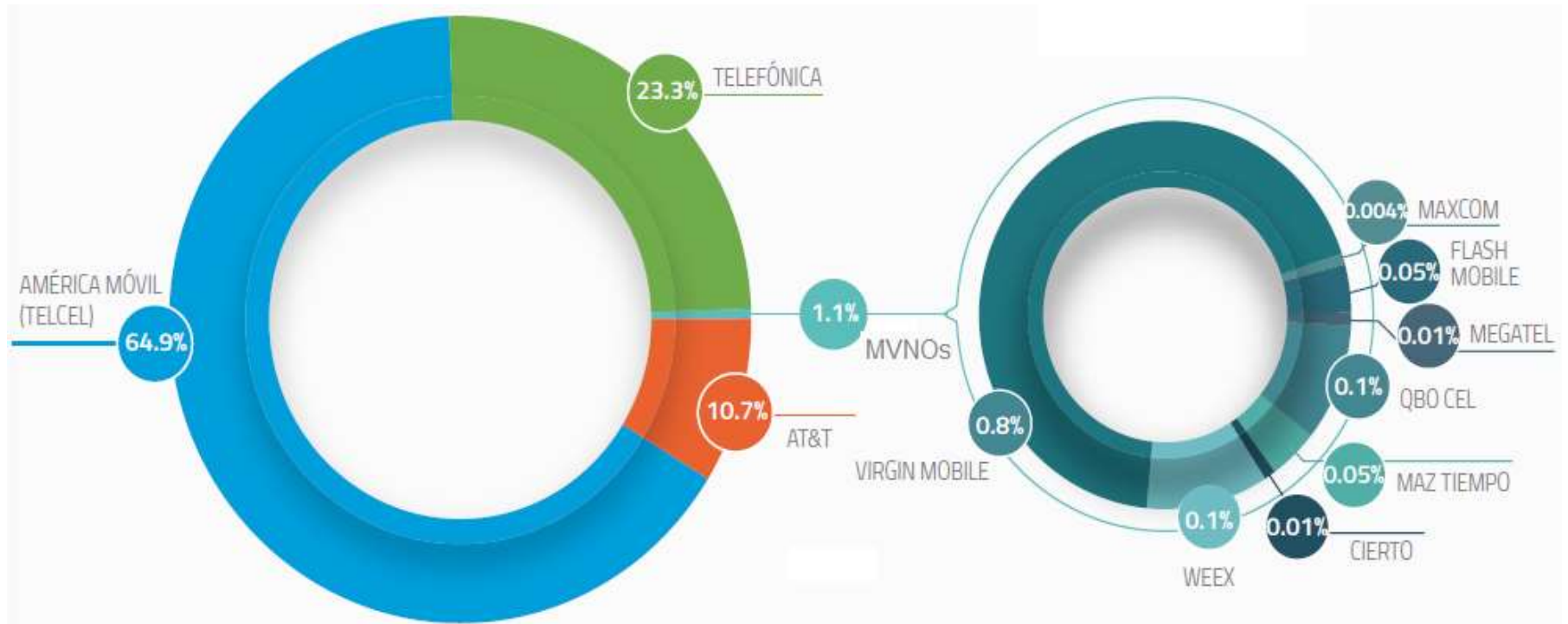
- 50% of the population live in areas where there is more than one fibre optic network
- Fibre to the Home (FTTH) represents 16.09% of the total broadband subscriptions.
- National fibre optic of around 19,457 km
- FTTH subscriptions have grown 159.5% from 2014 to 2016
- INCREASING internet wireless access networks have emerged on unlicensed frequencies 2.4 and 5 GHz
- xDSL subscriptions have decreased 28.5% from 2014 to 2016

# National mobile penetration

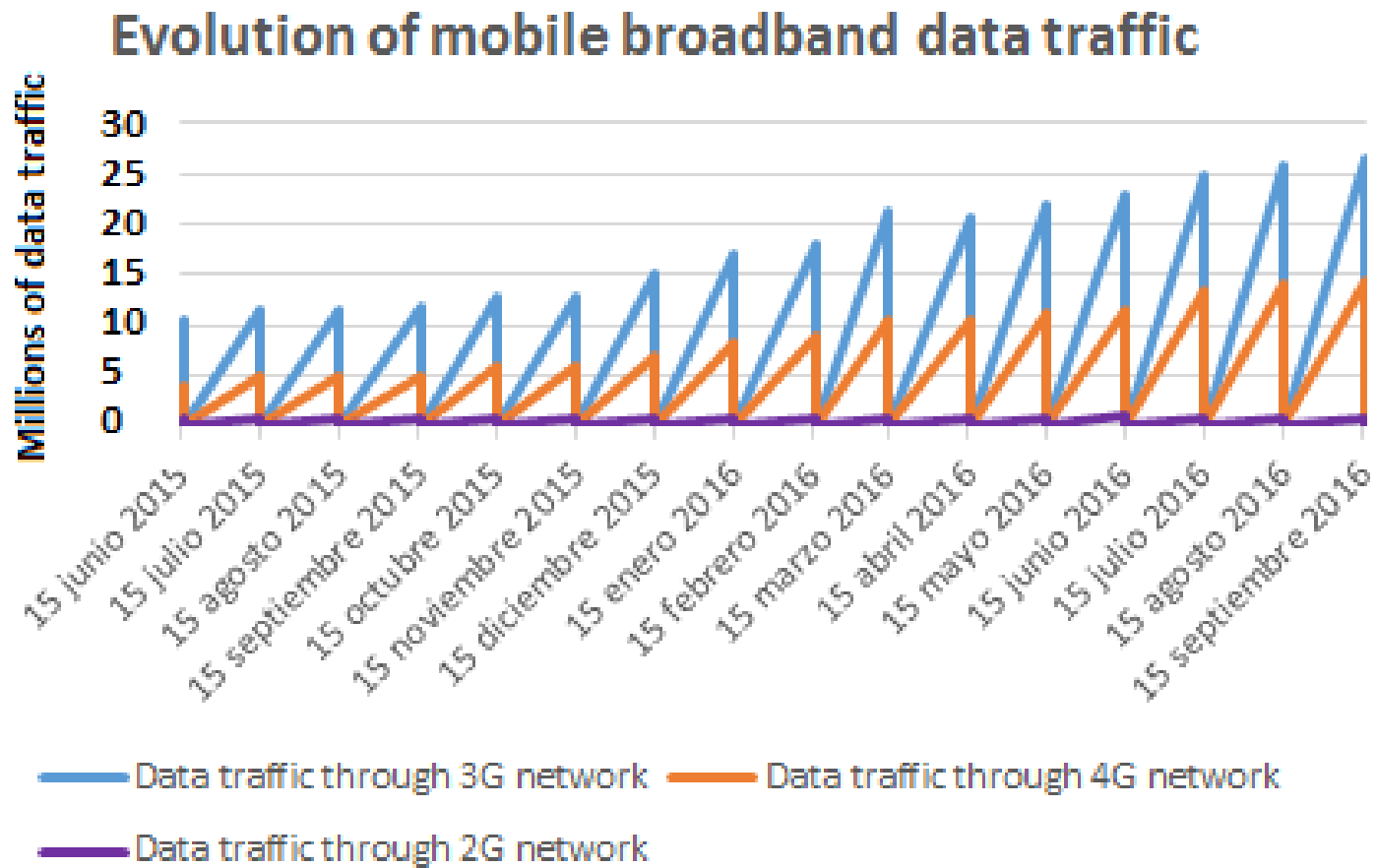
- 111.7 millions SIMS
- 91 /100 people
- 74.5 millions BB subscriptions
- 61 mobile broadband/ 100 people



# Mobile market share/ carrier (4<sup>th</sup> trimester 2016)



# National mobile traffic evolution



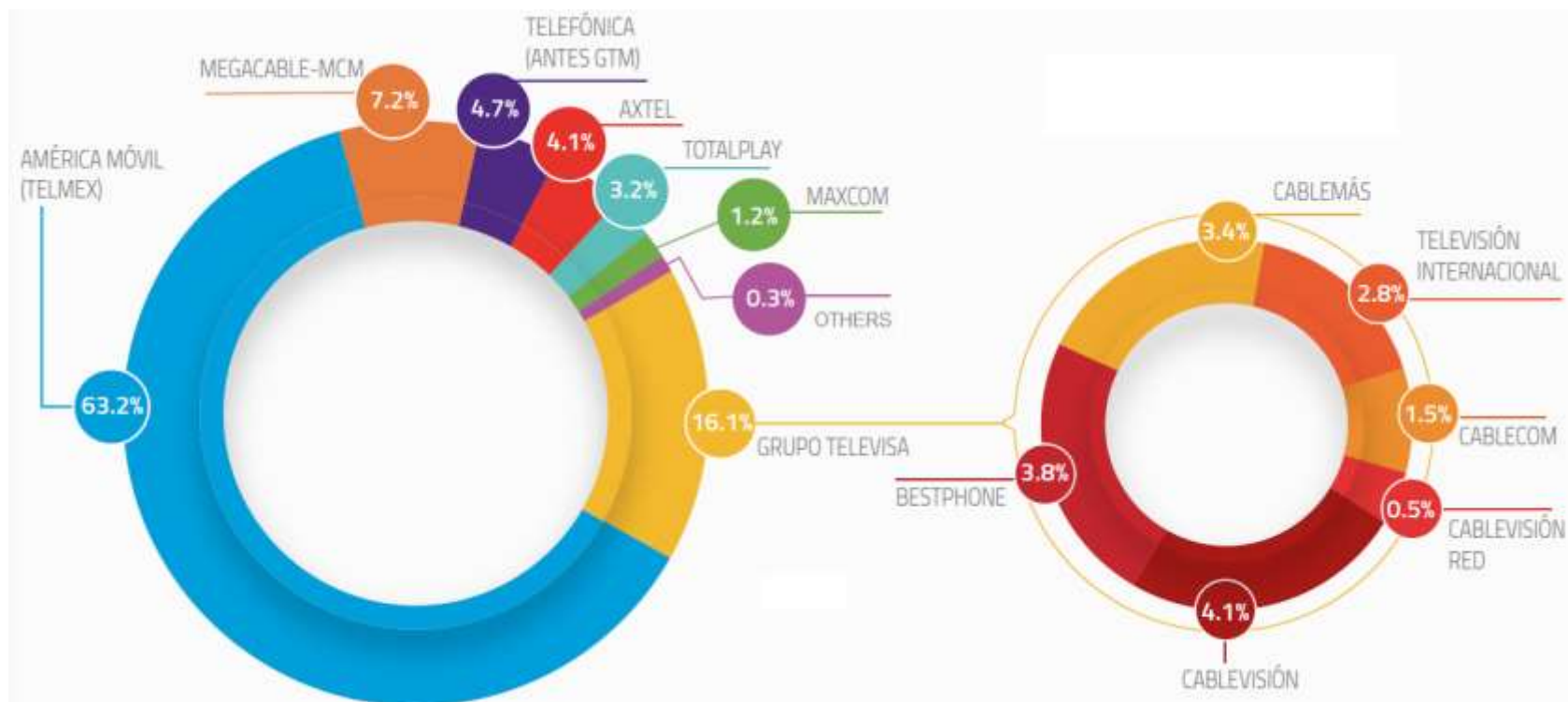


# National landline penetration

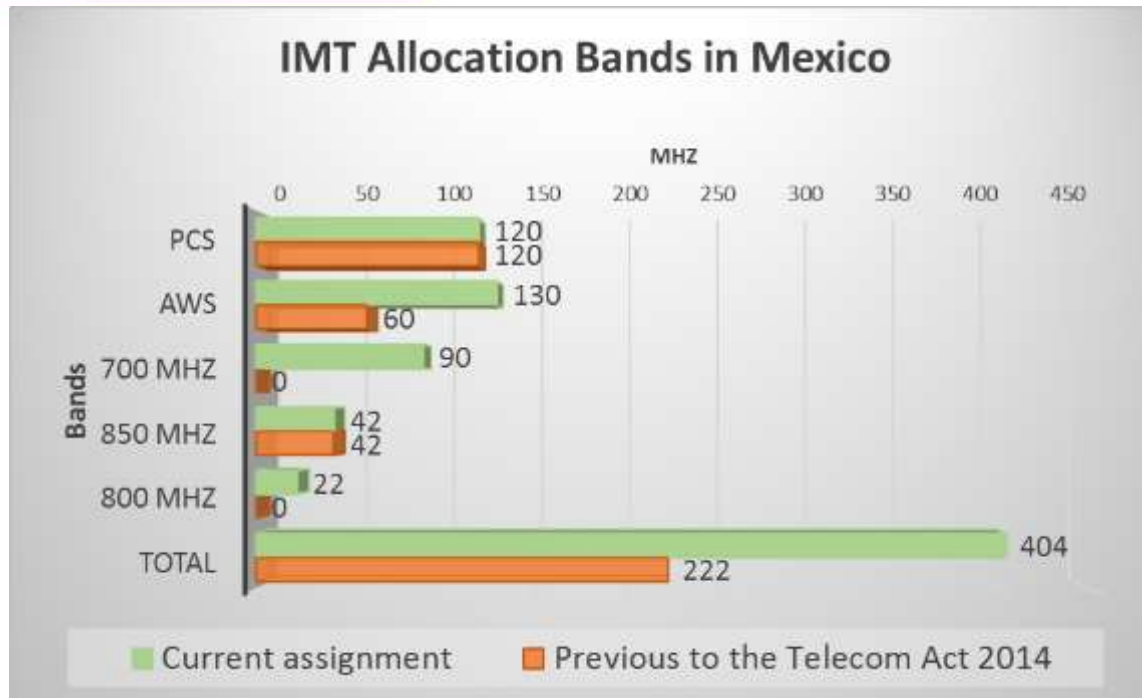
- 19.6 million landlines
- 59 per 100
- 48 broadband subscriptions per 100
- 79% have at least 10Mbps



# Landline market share (4<sup>th</sup> trimester 2016)



# IMT - current spectrum allocation

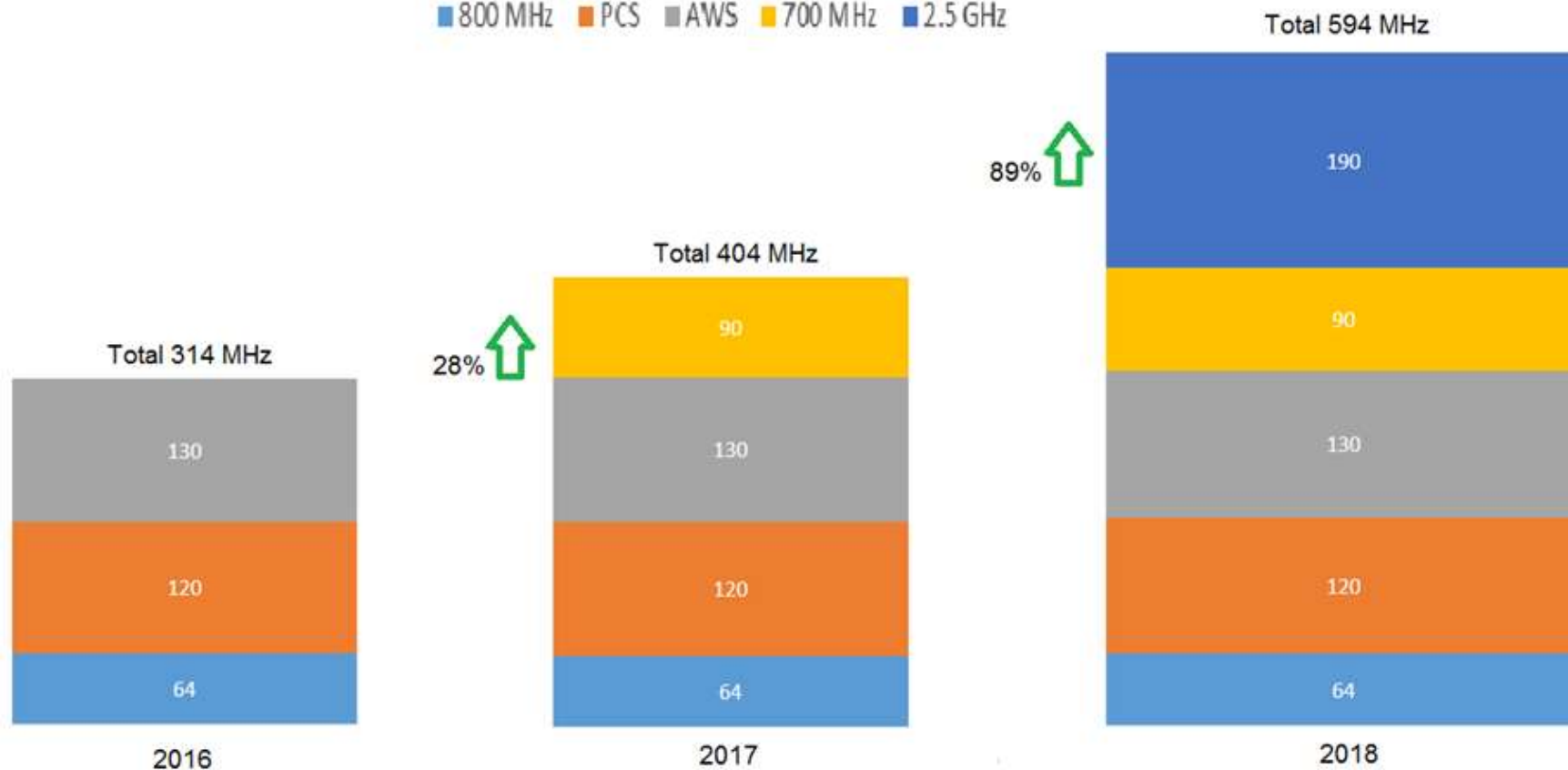


Frequency bands	Bandwidth assigned
<b>800 MHz band</b> (824-849/869-894 MHz) (806-824/851-869 MHz)	64 MHz
<b>AWS band</b> (1710-1780/2110-2180 MHz)	130 MHz
<b>PCS band</b> (1850-1910/1930-1990 MHz)	120 MHz
<b>700 MHz Band</b> (703 – 748/ 758 – 803 MHz)	90 MHz
<b>TOTAL</b>	<b>404 MHz</b>

# Short-term plan for IMT bands

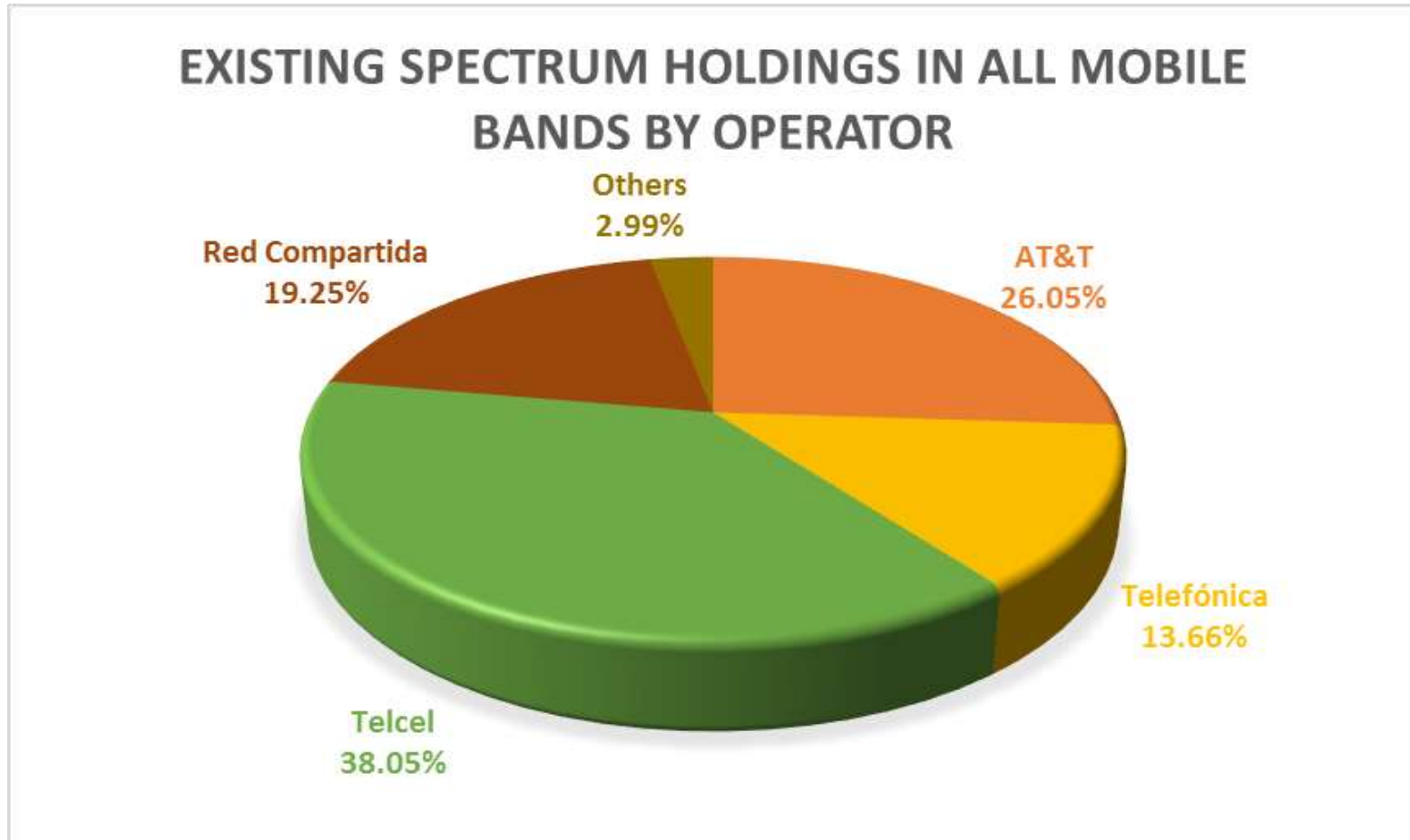
## SPECTRUM FOR MOBILE BROADBAND SERVICES (2015 - 2018)

■ 800 MHz ■ PCS ■ AWS ■ 700 MHz ■ 2.5 GHz



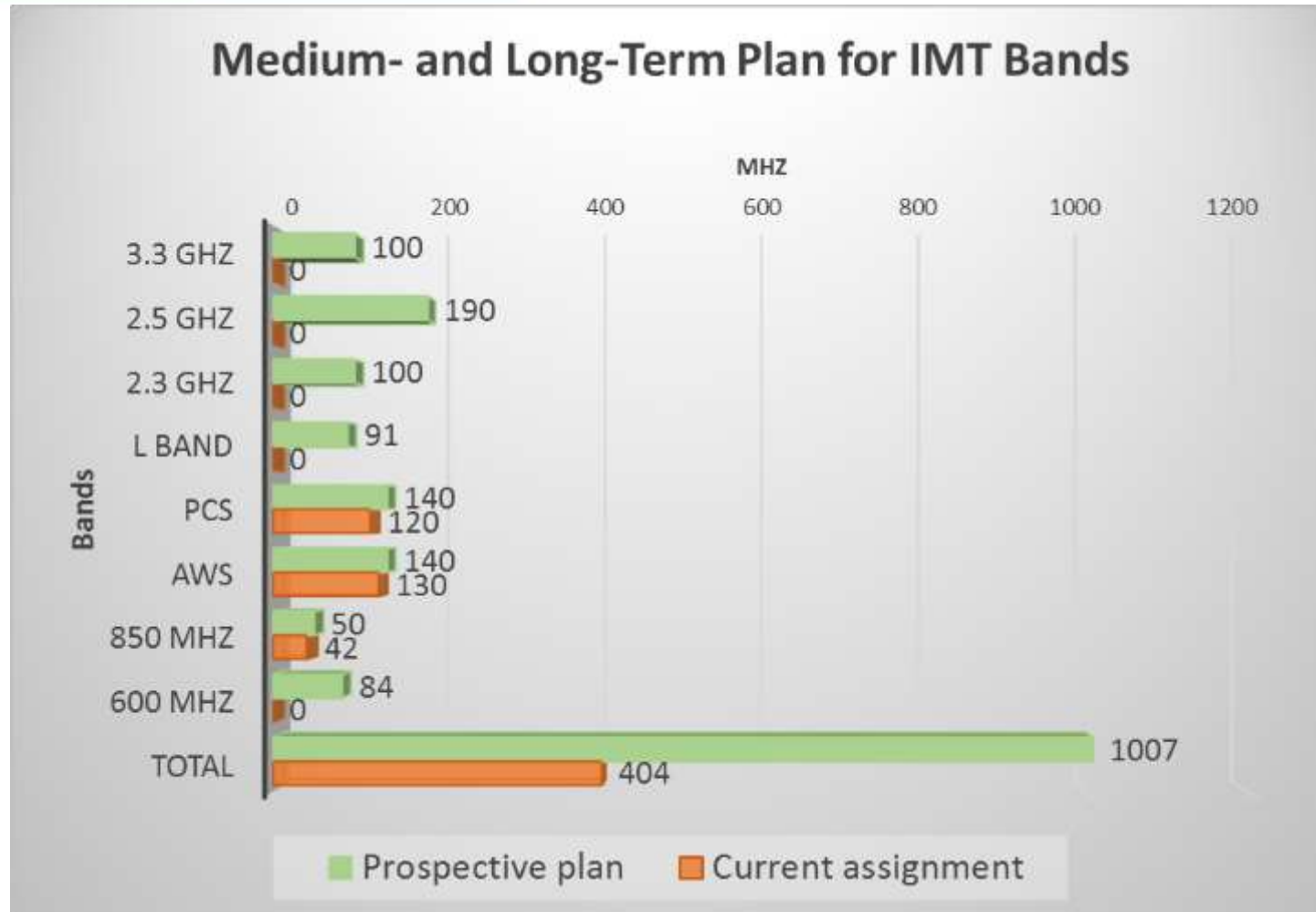


# Existing spectrum holdings



IMT spectrum holdings by operator, taking into account the recent 60 MHz acquisition of Telcel in the 2.5 GHz band.

# Medium- and long-term plan for IMT bands

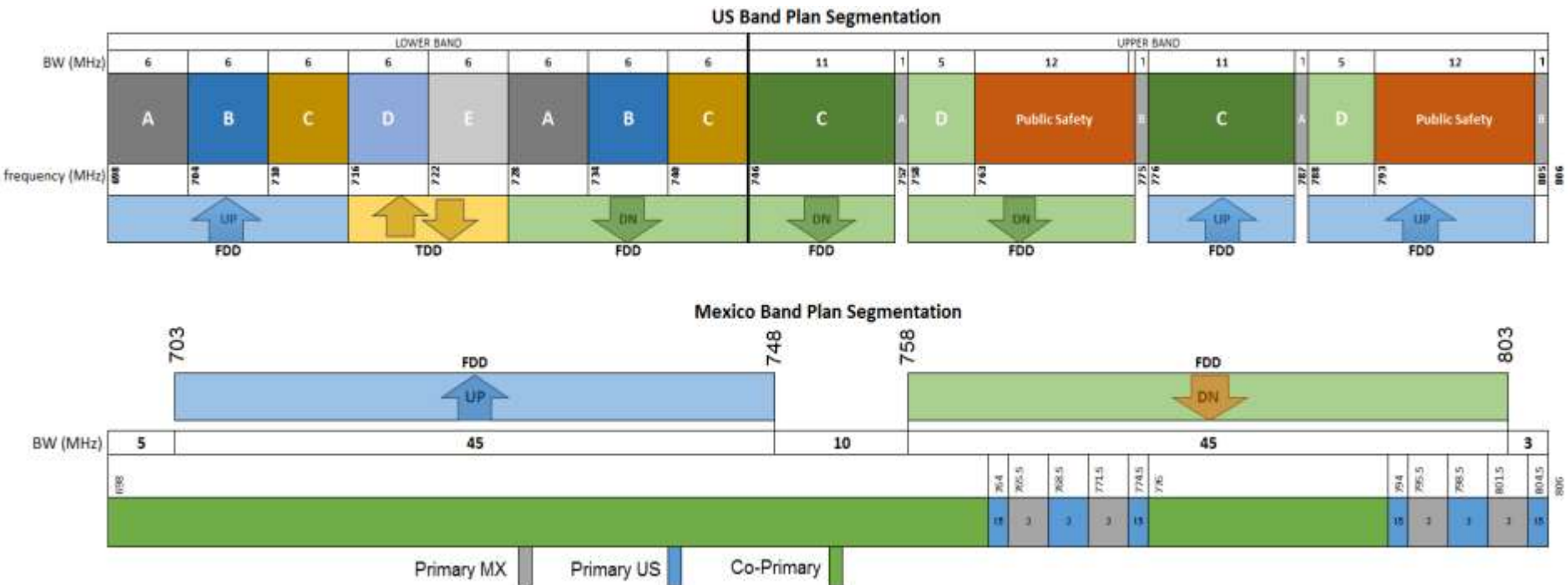


Future spectrum allocation in different bands such as the 3.3 GHz, 2.3 GHz, L band and 600 MHz band depend on the availability of technology for these frequencies.

# 700 MHz band plan adopted by Mexico

Mexico and the US have different band plan schemes for the 700 MHz band. Mexico has adopted the APT700 band plan:

- **Available contiguous spectrum** in two FDD blocks 45 + 45 MHz;
- **Adopted worldwide**, particularly in Asia and Latin-America;
- **Encourages the economies of scale** of the networks.



## In 2012 when this project was conceived out of a stagnant sector, rationale was:

- Infrastructure sharing to overcome entry barriers
- Need for bridge the digital divide in underserved locations
- Incumbent had no access obligations before 2014, huge barriers to competition
- Competitors struggling to survive and deploy to compete with the incumbent
- Bet on niche markets for MVNOs
- At least 2 Operators would demand capacity

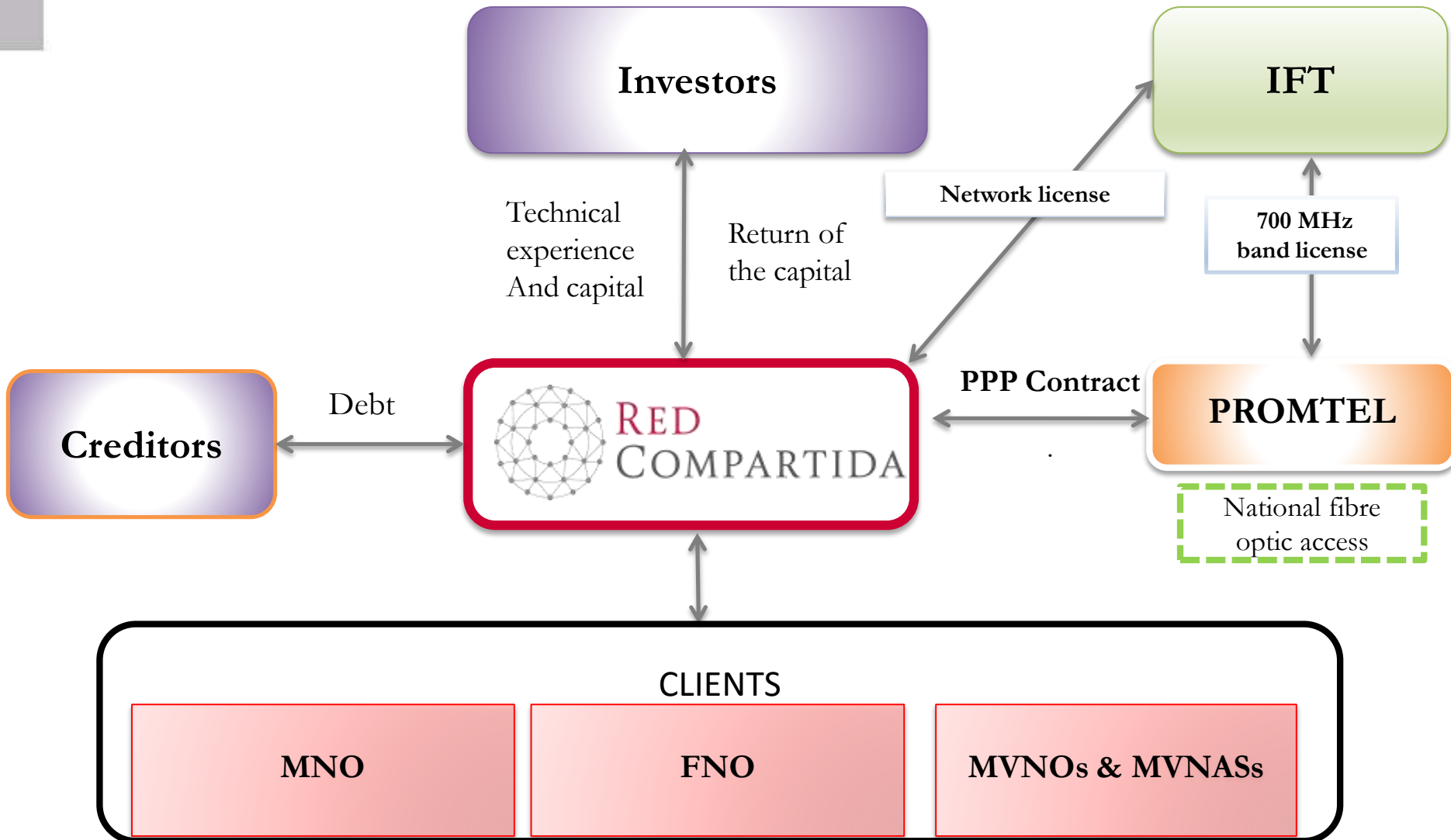


# Red Compartida - conformation

The 4G National Shared Wholesale Network will only provide wholesale services using 90 MHz in the 700 MHz band, according to the 3GPP class band 28.

Main Characteristics	Main obligations and rights	Spectrum
Constitutional mandate	92.2% of national coverage by the seventh year of operation	Wide bandwidth for broadband services: 90MHz (45 + 45 MHz)
Public-Private Partnership (PPP)	Availability to use a national fibre pair of the Red Troncal	Wide area coverage: out-door and in-door penetration capabilities
20 years of license (renewable)	Availability to use mobile infrastructure	Economies of scale: 3GPP band class 28
No mobile operator can have influence in the operation of the network	For every 1% of population covered in localities with more than 10K, at least 0.15% on localities less than 10K	Multiband configuration possibility: multiple carrier configurations
Main clients: MNO,FNO, MVNO, MVNA	Possibility of contracting incumbent services	

# Red Compartida – business case

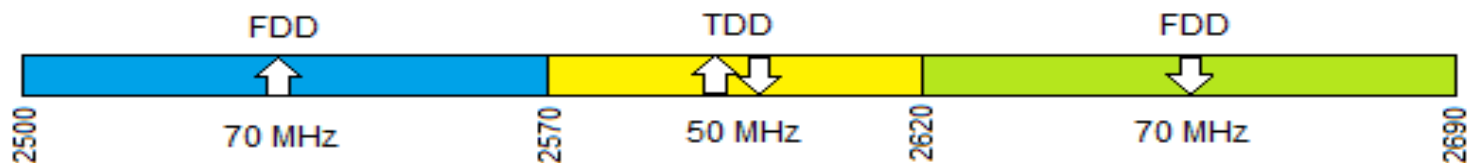


# 2.5 GHz band plan adopted by Mexico

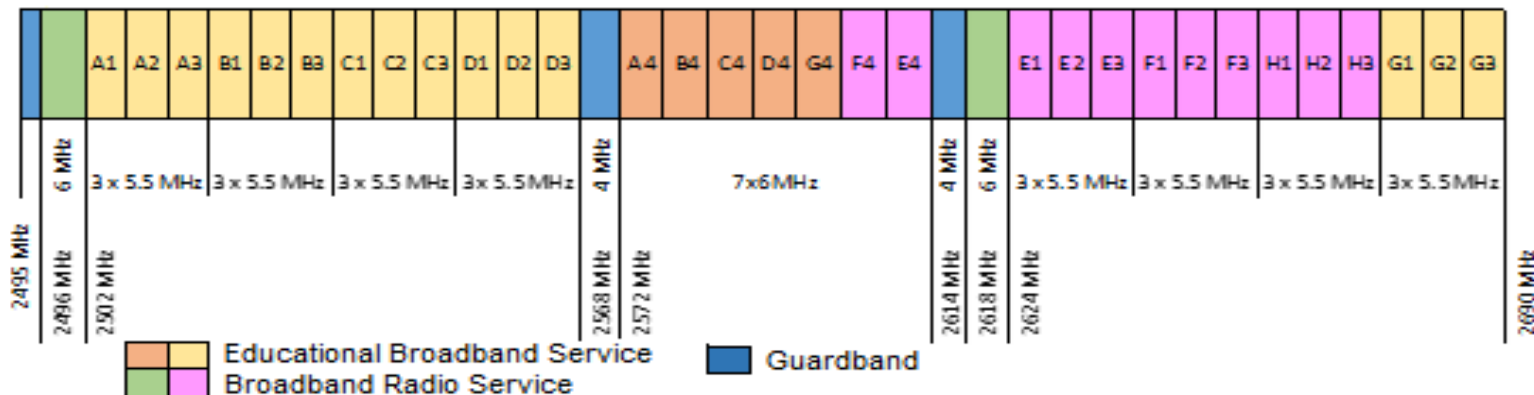
Mexico has adopted the C1 band plan according to the ITU-R M.1036.:

- Available **contiguous spectrum**;
- Availability to deploy **both FDD and TDD technologies**;
- **Adopted worldwide**: 3GPP class LTE bands;
- **Encourages the economies of scale**;
- **High availability of cell phones**.

Mexico Band Plan Segmentation



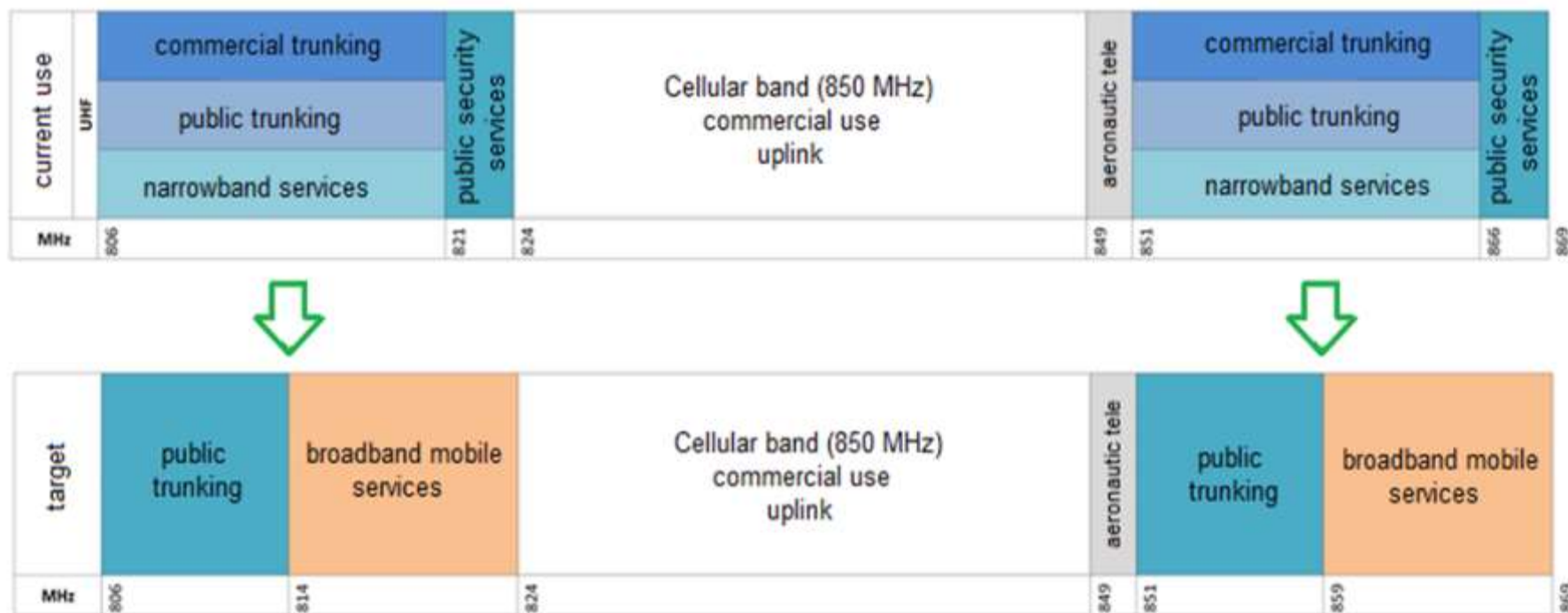
US Band Plan Segmentation



# Spectrum rebanding: 800 MHz band

Identified for IMT by ITU and Mexico has been preparing this band for mobile broadband services.

IFT has reallocated the current narrow band services, such as trunking and government security services:





# Second digital dividend - 600 MHz band

## The main reasons for clearing the 600 MHz band are:

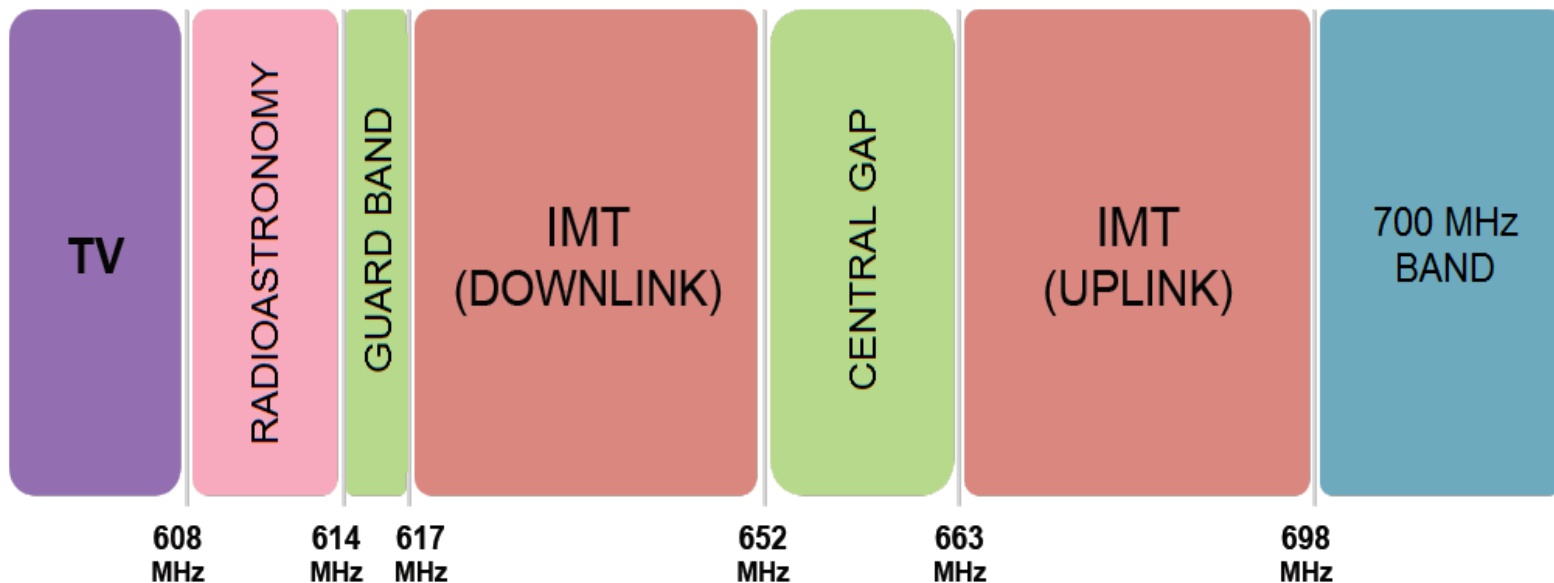
- The rising demand for high speed broadband services
- The propagation characteristics and the in-door penetration capabilities
- The transition to the Digital Terrestrial Television
- Bridging the digital divide
- The improvement of spectrum efficiency

## The main steps to achieve this are:

- To **relocate** the current services in the band to reorganize the 470 – 512MHz band for the DTT service.
- To **optimize** the use of the spectrum allocated for broadcast television in the band 470 – 608MHz.
- To **coordinate** the use of this band along the U.S. border area
- To **develop** strategies to promote the relocation of DTT channels in the VHF band.

## Second digital dividend – proposed 600 MHz segmentation band plan

Mexico is an active member in various groups of ITU. As part of the 5D group, both **Mexico and New Zealand have proposed a segmentation plan** for the 600 MHz to be included on the ITU-R Recommendation M.1036 as follows:



The deadline to clear the 600 MHz band is the third trimester of 2018.

# Unlicensed bands – 60 GHz band

In Mexico there are several unlicensed bands identified in the National Frequency Allocation Chart. The most common bands used for Telecom services are:

- **900 MHz band** (902 – 928 MHz)
- Digital Enhanced Cordless Telecommunications (**DECT**) **frequencies** (1920 – 1930 MHz)
- **Wi-Fi** (2400 – 2483.5 MHz)
- **Wi-Fi** in the 5 GHz frequencies (5.15 – 5.25 GHz, 5.25 – 5.35 GHz, 5.47 – 5.6 GHz, 5.65 – 5.725 GHz, 5.725 – 5.85 GHz)

# Unlicensed bands – 60 GHz band

We recently identified the **60 GHz band** (57 – 64GHz) as **unlicensed spectrum**, mainly to satisfy two primary types of equipment serving different markets:

- 1) outdoor** short-range point-to-point systems to provide broadband backhaul links or extend the reach of optic-fiber networks;
- 1) indoors** wireless personal area networking (WPAN) for devices designed to share uncompressed HD data signals, entertainment devices, HD Television, laptop, smartphones and tablets.



# Spectrum auctions – AWS

## Purpose:

- Bidding up to 80MHz;
- To obtain contiguous spectrum;
- To satisfy capacity requirements.

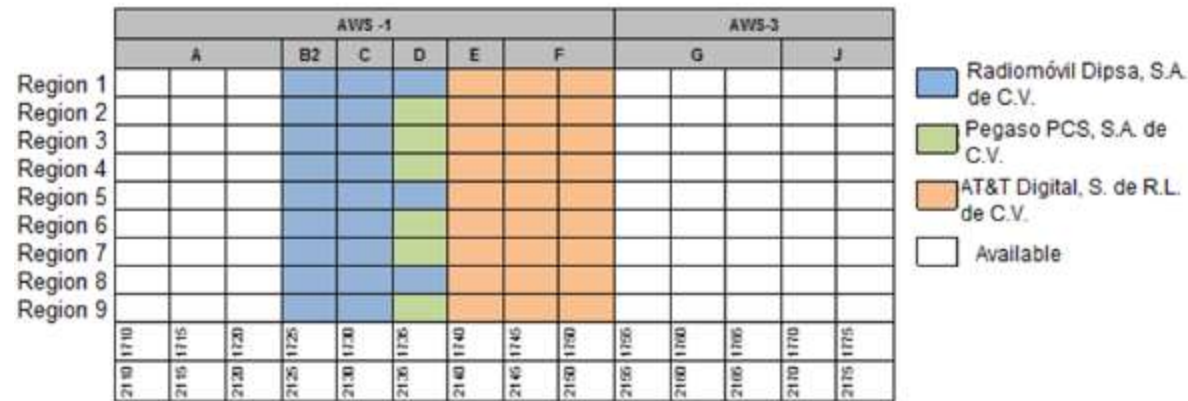
## Process:

- Combinatorial clock auction;
- 8 national blocks;
- Caps of 5 + 5 MHz;
- no bidder could accumulate more than 80MHz, nor could more than 50MHz in AWS-1.

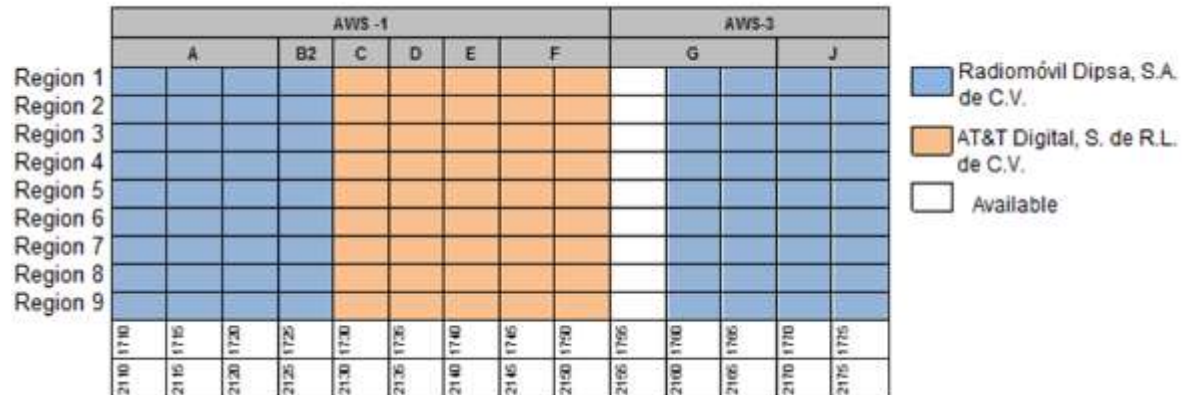
## Result:

- **\$0.18USD/MHz/pop**
- Radiomóvil Dipsa (AMX): 4 national blocks in AWS-1 and 4 in AWS-3;
- AT&T: 5 national blocks in AWS-1.

AWS spectrum allocation **before** the auctioning process:



AWS spectrum allocation **after** the auctioning process:

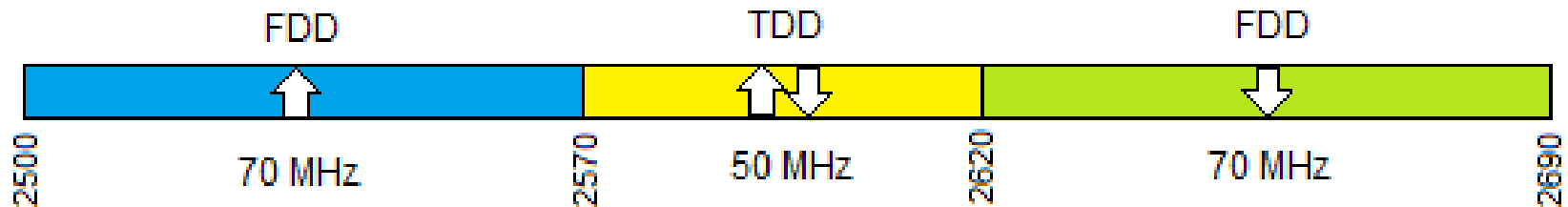


There is still available one national block of 10MHz

## 2.5 GHz band auction

Mexico band plan comprised by two FDD segments of 70 MHz and one TDD segment of 50 MHz:

### Mexico Band Plan Segmentation



The Federal Telecommunications Institute is currently working on:

- The spectrum packaging
- The reserve price
- The auction format and key rules

The aim of this auction is:

- To **maximize usable spectrum**
- To provide **sufficient flexibility to gain contiguous spectrum blocks**;
- To **avoid outcomes** that might be **detrimental to downstream competition**
- To **avoid harmful interference** between FDD and TDD technologies
- To provide the required **spectrum for high-capacity and good-quality** of services for the users

# Dynamic use of the spectrum

**In some rural locations licensed spectrum is underused. Thus, we can start analyzing chances to share on a secondary basis where technically feasible as smarter technologies allow it:**

## Technologies:

- RAN sharing
- TV White Spaces
- Spatial/Geographical Sharing
- Simultaneous use of specific frequencies
- Low Power Radio Technologies
- Cognitive Radios
- Licensed + Unlicensed frequencies

## Authorizations:

- Licensed Shared Access
- Authorised Shared Access
- Licensed Assisted Access (LTE + unlicensed spectrum at 5 GHz)
- Priority Sharing
- Secondary Market of Spectrum (leasing frequencies bands)

# 5G: Internet of Things

5G technology not only represents the evolution of the 4G technology but also the revolution of connectivity. **It will allow the development of the Internet of Things, autonomous vehicles, remote virtual health care, broadband access in dense regions, higher mobility, low latency, and ultra-reliable communications.**

**IoT requires a wide range of frequencies for all types of services**, according to their specific applications and operational environment:

- Short range systems and devices (wearables, smart homes)
- Wide coverage systems (smart metering)
- Narrowband devices (monitor sensors)
- Broadband devices (CCTV, Big Data)
- Mission critical services (surveillance)
- Different Levels of Service

**Exploiting technologies such as Wi-Fi, Near Field Communications (NFC), Radio Frequency identification (RFID), among others, on both licensed and unlicensed frequencies.**

# 5G: Internet of Things

It is important that 5G spectrum bands are harmonised globally. Therefore, the World Radiocommunication Conference recognised that particular frequencies could be best suited to 5G:

Band	Technology	Region
600 MHz	LTE/5G	North America
700 MHz	LTE/5G	APAC, Europe Middle East, Africa, LatAm
Band	Technology	Region
3.3 – 3.4 GHz	LTE/5G	APAC, Africa, LatAm
3.4 – 3.6 GHz	LTE/5G	Global
3.55 – 4.2 GHz	LTE/5G	USA
3.6 – 3.8 GHz	5G	Europe
4.5 GHz	5G	Japan, China

← Full coverage with < 1GHz

← Dense urban high data rates

Band	Technology	Region
24.25 – 27.5 GHz	5G	For discussion at WRC-19
31.8 – 33.4 GHz	5G	For discussion at WRC-19
37 – 43.5 GHz	5G	For discussion at WRC-19
45.5 – 50.2 GHz	5G	For discussion at WRC-19
50.4 – 52.6 GHz	5G	For discussion at WRC-19
66 – 76 GHz	5G	For discussion at WRC-19
81 – 86 GHz	5G	For discussion at WRC-19

← Future mm wave bands

# Thank you!

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**Commissioner**

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