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The spectrum challenges in Portugal

How can administrations best balance the spectrum opportunities with the identified requirements?

Miguel Capela

CEPT Workshop on new spectrum solutions for industry sectors, 03.05.2018

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1. SECTORS/MARKETS AND 5G

SECTORS/MARKETS

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Equipment/network manufacturers

Connectivity providers

Automotive	Media and entertainment	Manufacturing	Logistics	Agriculture	Energy and utilities	Healthcare
▸ Connected cars ▸ Infotainment services ▸ Platooning	▸ Live events ▸ Immersive media	▸ Logistics tracking ▸ Robot control ▸ Augmented reality (AR)	▸ Drone delivery ▸ Connected ports	▸ Agriculture drones ▸ Precision farming	▸ Smart metering ▸ Smart grids	▸ Remote monitoring ▸ Telesurgery

Source: DotEcon and Axon

- **Regulation and "5G"**
- **What is 5G verticals?**
- **Should we call it 5G? Or 5G verticals? Or only verticals?**

EVOLUTION OF “xG” TECHNOLOGIES

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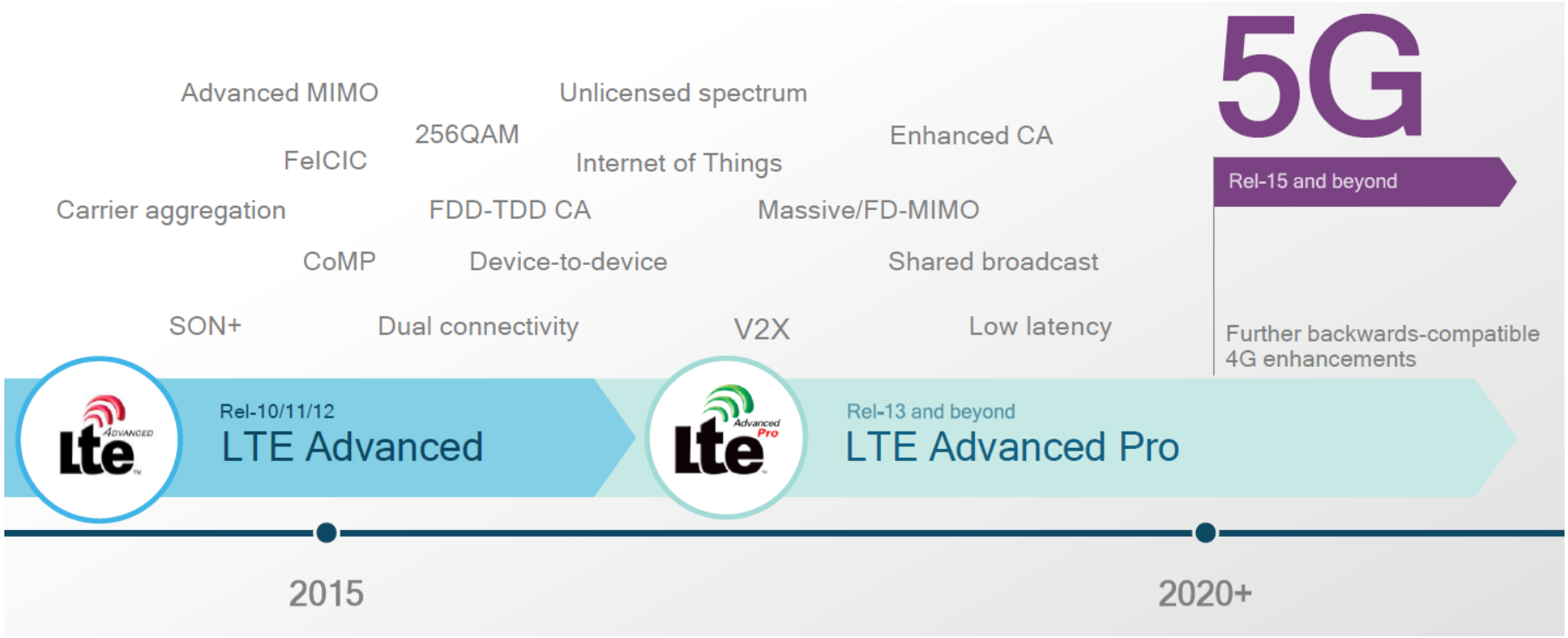

Source: Qualcomm, “Leading the world to 5G”, February 2016

With 5G Still in the Works, 6G Is Already Taking Shape

Source: https://www.pcmag.com/article/360533/what-is-6g

Non “xG” TECHNOLOGIES

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- **Long range: LoRaWAN, SigFox (IoT/M2M)**
- **RLAN *(Radio Local Area Network) – ex.* IEEE 802.11ah**
- **ITS *(Intelligent Transport Systems)* - IEEE 802.11p**
- **FRMCS (*Future Railway Mobile radio Communications System*)**
- **PMR (*Private Mobile Radio*)**
- **SRDs *(Short Range Devices)***

2. CHALLENGES IN PORTUGAL

Key element concerns spectrum identification

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- **700 MHz** as the band capable of enabling nationwide coverage
- Feasibility of frequency bands **3,4-3,8 GHz** and **26 GHz** (*pioneer bands* for 5G in the EU)
- Identification of more harmonized spectrum above 6 GHz for 5G (IMT2020) in WRC-19
- **700 MHz:** During the 1st half of 2018, a open market hearing was carried out
  - Participation of manufacturers, operators, private and public entities, users and others
  - Also related to frequency bands other than 700 MHz: e.g. 900 MHz, 1500 MHz, 2.6 GHz, 3.4-3.8 GHz and 26 GHz
  - The 700 MHz band, is considered particularly suitable to ensure the provision of broadband services in rural areas
  - An analysis of the pattern of procedure for TRA-ECS spectrum allocation is under way

700 MHz FREQUENCY BAND

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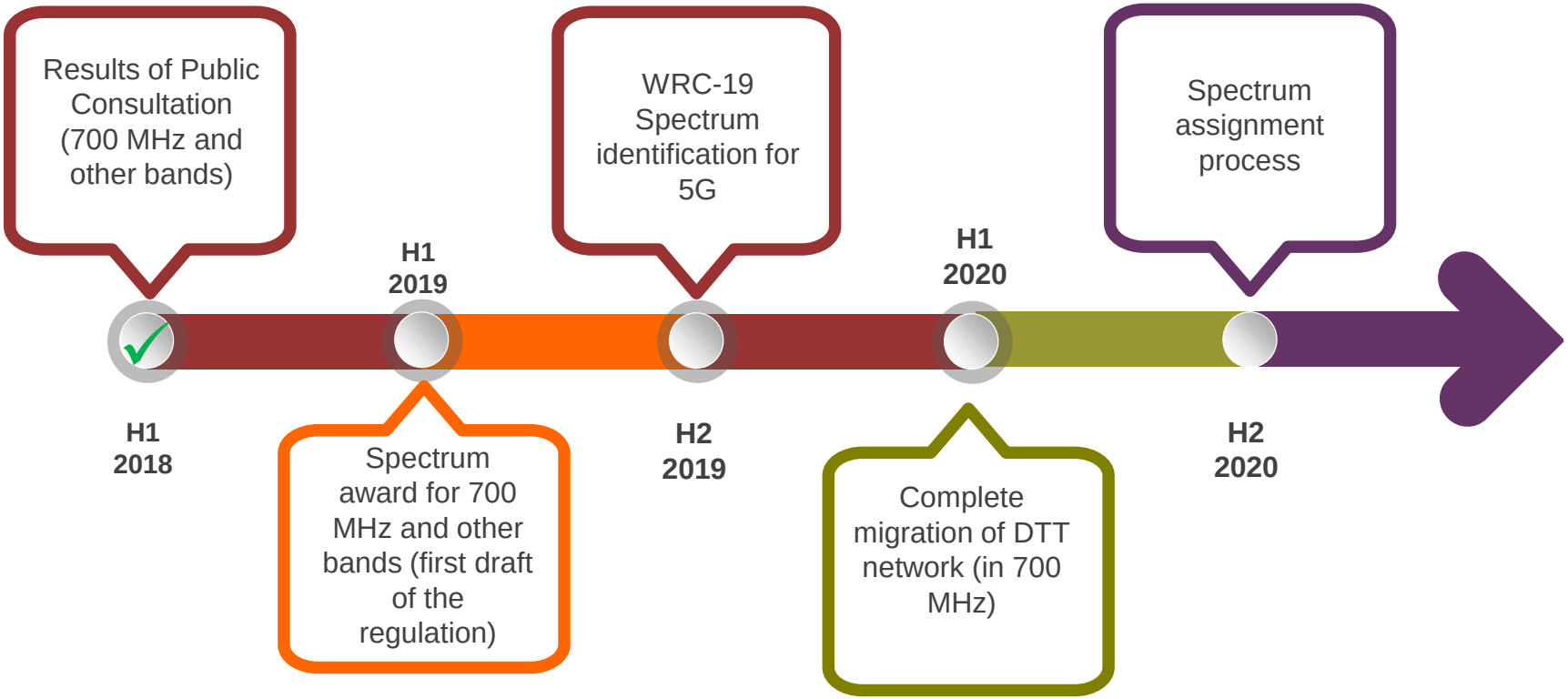
703-708	708-713	713-718	718-723	723-728	728-733			758-763	763-768	768-773	773-778	778-783	783-788
MFCN Uplink						Duplex Gap	TDT	MFCN Downlink					
30 MHz (6 blocos de 5 MHz)						25 MHz		30 MHz (6 blocos de 5 MHz)					



Source: ANACOM

3.4 – 3.8 GHz FREQUENCY BAND

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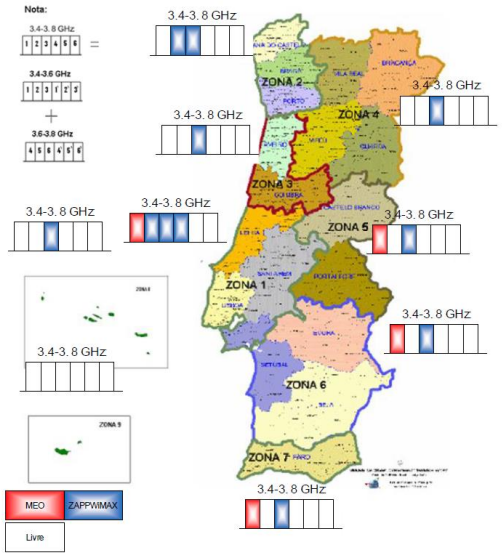
	3,4-3,6 GHz			3,6-3,8 GHz		
Zona	3,410-3,438 GHz	3,441-3,469 GHz	3,472-3,500 GHz	3,602-3,630 GHz	3,633-3,661 GHz	3,664-3,692 GHz
	3,510-3,538 GHz	3,541-3,569 GHz	3,572-3,600 GHz	3,702-3,730 GHz	3,733-3,761 GHz	3,764-3,792 GHz
1	MEO	BBP	BBP	BBP	Livre	Livre
2	Livre	BBP	BBP	Livre	Livre	Livre
3	Livre	Livre	BBP	Livre	Livre	Livre
4	Livre	Livre	BBP	Livre	Livre	Livre
5	MEO	Livre	BBP	Livre	Livre	Livre
6	MEO	Livre	BBP	Livre	Livre	Livre
7	MEO	Livre	BBP	Livre	Livre	Livre
8	Livre	Livre	BBP	Livre	Livre	Livre
9	Livre	Livre	Livre	Livre	Livre	Livre



Source: ANACOM

“450 MHz” FREQUENCY BAND

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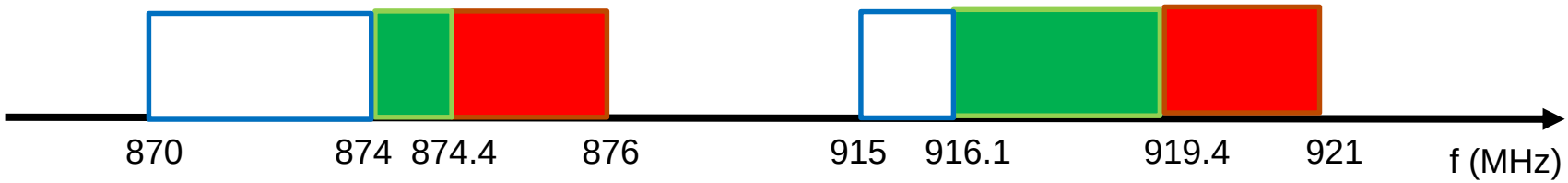
- Request for **utilities** (e.g. energy sector)
- **Hybrid solution** (public mobile networks + private network)
- Private network to be developed in **specific locations** where the resilience of the public mobile networks do not fit with the requirements of the utilities
- Use of **LTE** in the private network in the 450 MHz frequency band
- **Mobile terminals** should be able to use the 450 MHz band + the frequency bands in use in the public mobile networks
- Evaluation of **spectrum scarcity** for other utilities (e.g. water sector)

870 – 876 MHz / 915 – 921 MHz

- COMMISSION IMPLEMENTING DECISION (EU) 2018/1538 of 11 October 2018 on the harmonisation of radio spectrum for use by short-range devices within the 874-876 and 915-921 MHz frequency bands
  - Introduction of technically advanced RFID solutions as well as new short-range devices enabling new types of machine-to-machine and IoT applications
  - “Reservation” of the 874.4-876 and 919.4-921 MHz bands for FRMCS
  - Non-specific short- range devices (874-874.4 MHz)
  - Wideband data transmission devices (917.4-919.4 MHz)
  - Radio Frequency Identification (RFID) devices (916.1-918.9 MHz)
  - Non-specific short- range devices (917.3-918,9 MHz)
  - Non-specific short- range devices (917.4-919.4 MHz)



LSA Pilot network in Portugal

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- **ANACOM and partners conduct experimental testing on an LSA Pilot network in Portugal**
- Conducted from 28 to 30 January 2019, at Instituto de Telecomunicações (Telecommunication Institute), on the University of Aveiro campus
- ANACOM's partners in this study are:
  - Mobile Operators: MEO, NOS, Vodafone Portugal;
  - Television operators: RTP, SIC, TVI;
  - Industry: Huawei, Nokia and Fairspectrum;
  - Research and development (R&D): IT - Instituto de Telecomunicações (Institute of Telecommunications).
- This pilot project aims to evaluate implementation of the LSA model in the 2.3 - 2.4 GHz band, from a practical point of view and in the light of the realities of the Portuguese situation; a technological demonstrator was created as proof of concept for this purpose.
- https://www.anacom.pt/render.jsp?contentId=1467895&languageId=1

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3. SOME QUESTIONS …

SOME QUESTIONS …

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- **Should we impose coverage obligations?**
  - To the verticals?
  - On a technology neutral basis?
  - Specific to 5G technology?
  - The obligations should include QoS?
- **Are the verticals interested in the 5G technology or in other technologies? Or both …?**
- **Is there a need for private/local 5G spectrum for verticals?**
- **Is the unlicensed spectrum enough for some verticals?**
- **New verticals: e.g. radio spectrum in underground mines**

Thank you for the attention