

## The Need for 5G Spectrum

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*\* Disclaimer: the views expressed are those of the author and cannot be regarded as stating an official position of the European Commission.*

## Identify the spectrum mix

- ✓ Spectrum amount and quality
- ✓ Low-mid-high ranges: match the IoT/eMBB service mix

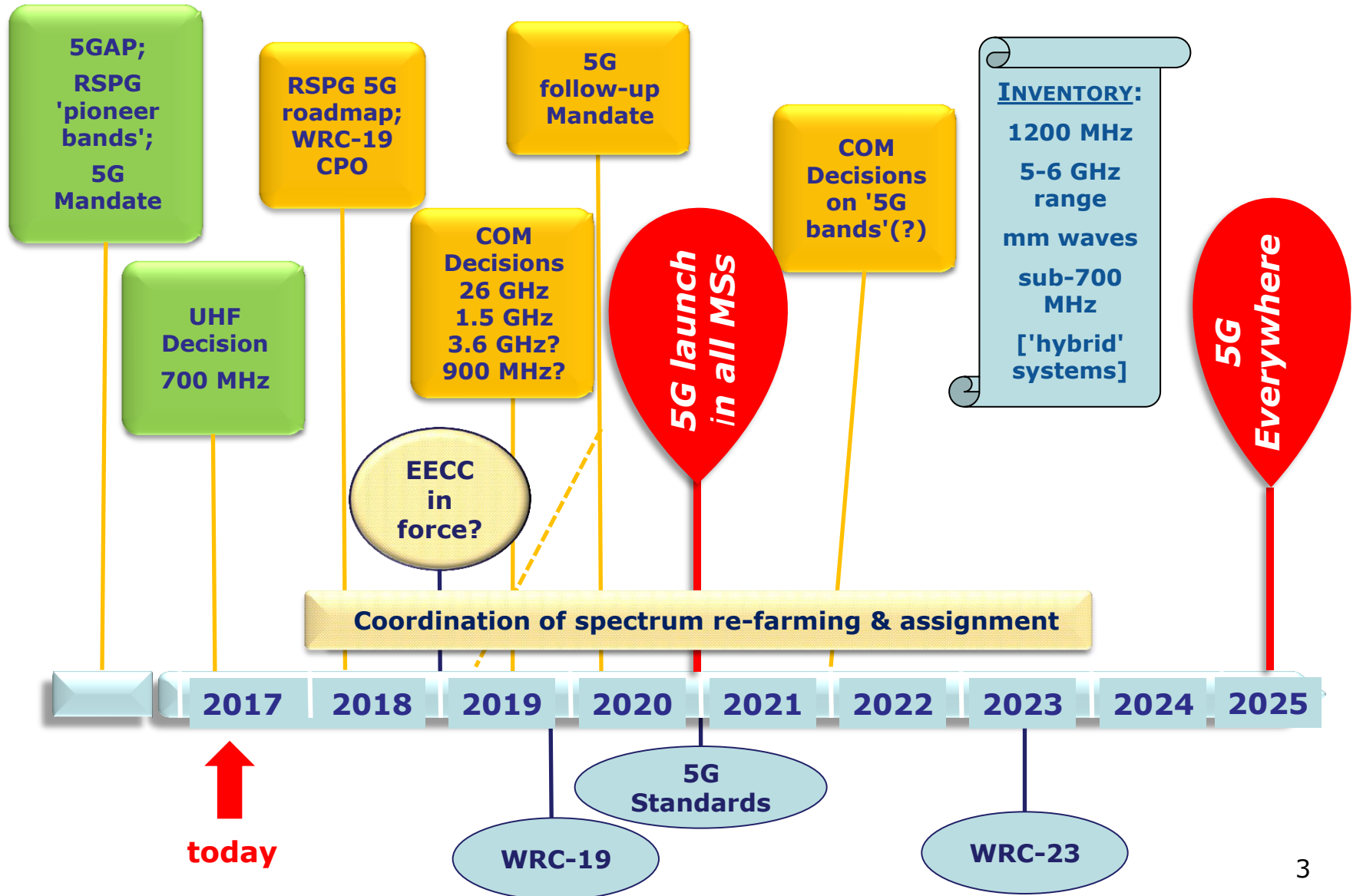
## Designate common bands under harmonised conditions

- ✓ 5G 'fitness' of existing EU-harmonised bands
- ✓ Global bands to the extent possible

## Extend 5G spectrum coordination

- ✓ Per service approach
- ✓ Coverage criteria and authorisation models
- ✓ Timely supply to the Single Market

# 5G Spectrum Roadmap



## **700 MHz (harmonised; progressing assignment)**

- ✓ COM Decision (28 April 2016): WBB & national options
- ✓ UHF Decision (EP and Council, 25 May 2017)
  - ✓ Transition schedule by mid-2020 (+ 2 years); first DE, FR, FI

## **3.6 GHz (harmonised, available, partly used)**

- ✓ Review of COM Decision by 2019 (ongoing)
- ✓ Re-farming/defragmentation (not EU competence)

## **26 GHz (ongoing)**

- ✓ COM Decision before WRC-19
- ✓ Harmonised technical/sharing conditions (incumbents!)
- ✓ Authorisation models (RSPG opinion, 5G-PPP input)
- ✓ Synergies with 28 GHz for the European priorities

## RSPG Opinions (February 2017)

- ✓ No need for *dedicated* IoT spectrum,
- ✓ No current spectrum constraints for ITS;
- ✓ Utilise harmonised bands: licensed or licence-exempt

## Sub-1GHz for IoT

- ✓ NB-IoT in 'mobile bands'; 2x3 MHz @ 700 MHz (an option);
- ✓ 800-900 MHz range

## ITS: 5.9 GHz (& 63-64 GHz & 'mobile bands')

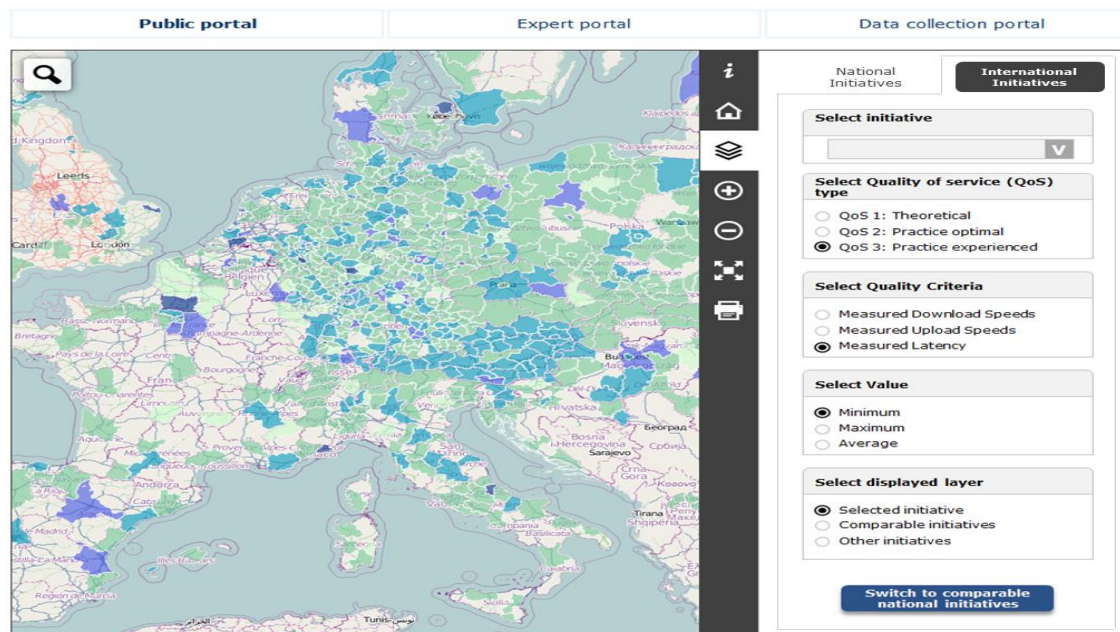
- ✓ Band extension (V2V & urban rail)
- ✓ Issue: competing standards vs. **compatibility & spectrum efficiency**

## Audio-visual: sub-700 MHz band

- ✓ DTT/PMSE safeguards by 2030 and national flexibility → *EU role*
- ✓ Emerging mobile ecosystem at 600 MHz (USA)




## EU Mapping Platform

*Mapping fixed and mobile quality of broadband services in Europe*



Common **quality criteria** and input data format  
Central database with visualisation  
Integration of different data sources

## Quality indicators for mobile connectivity

<p><b>QoS-1:</b> Calculated availability of service</p>	<p><b>What:</b> Theoretical network performance of existing infrastructure  <b>How:</b> Data based on mobile operators' radio field planning / <u>geodata</u>-based simulation models / prediction tools / no pure infrastructure data (backhaul network)</p>	
<p><b>QoS-2:</b> Measured provision of service</p>	<p><b>What:</b> Provision of service measured  <b>How:</b> Measurement through drive tests under controlled conditions to <u>exclude</u> bias of device / end user as much as possible</p>	
<p><b>QoS-3:</b> Measured experience of service</p>	<p><b>What:</b> Actual user's experience when using Internet Access Service (IAS)  <b>How:</b> Measurement via online speed tests <u>including</u> end user's environment</p>	

**Thank you for your attention !**





# Priority Bands and International Context

Frequency band	Bandwidth	For eMBB	Device availability	Spectrum availability				
				Europe	USA	JPN	KOR	CHN
<b>700 MHz</b>	2x45 MHz	☹️	😊	😊 partially	😐 Band plan	😊 partially	😊	😐 Band plan
<b>3.3-3.4GHz</b>	100MHz	😐	😊	☹️	☹️	☹️	☹️	😐
<b>3.4-3.6GHz</b>	200MHz	😐	😊	😊	😐	😐	😊	😊
<b>3.6-3.8GHz</b>	200MHz	😐	😊	😊	😐 Not > 3.7GHz	😐	😊	☹️
<b>3.8-4.2GHz</b>	400MHz	😐	😊	☹️	☹️	😐	😐	☹️
<b>4.4-4.99GHz</b>	500MHz	😐	😊	☹️	☹️	😊 4.4-4.9GHz only	☹️	😐 4.4-4.5, 4.8-4.99GHz only
<b>5.725-5.85GHz</b>	125MHz	😐	😊	😐	😊	😐	😊	😐
<b>24.25-27.5GHz</b>	3,250MHz	😊	?	😊	😐? Small portions	😐	😐	😊
<b>27.5-29.5GHz</b>	2,000MHz	😊	?	☹️	😊 Only 850 MHz	😐 in question	😊	☹️
<b>31.8-33.4GHz</b>	1,600MHz	😊	?	😊	😐 31-31.3GHz	😐	😊?	😐?
<b>40.5-43.5GHz</b>	3,000MHz	😊	?	😊	😐 37-40 GHz OK	😐 Partially	😊? 37-42.5GHz	😐 39-40GHz ?