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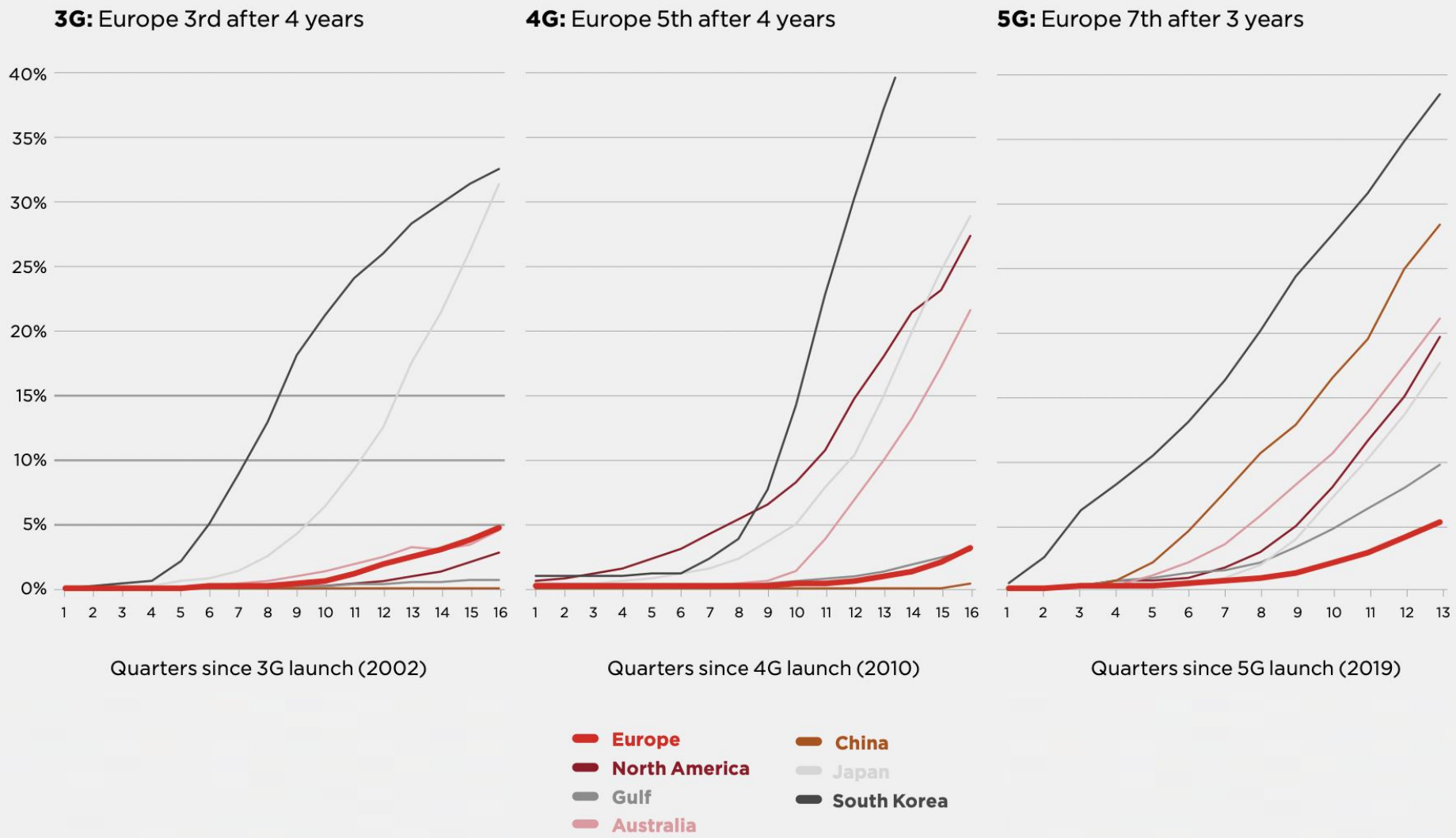
Spectrum needs and the 5G global situation

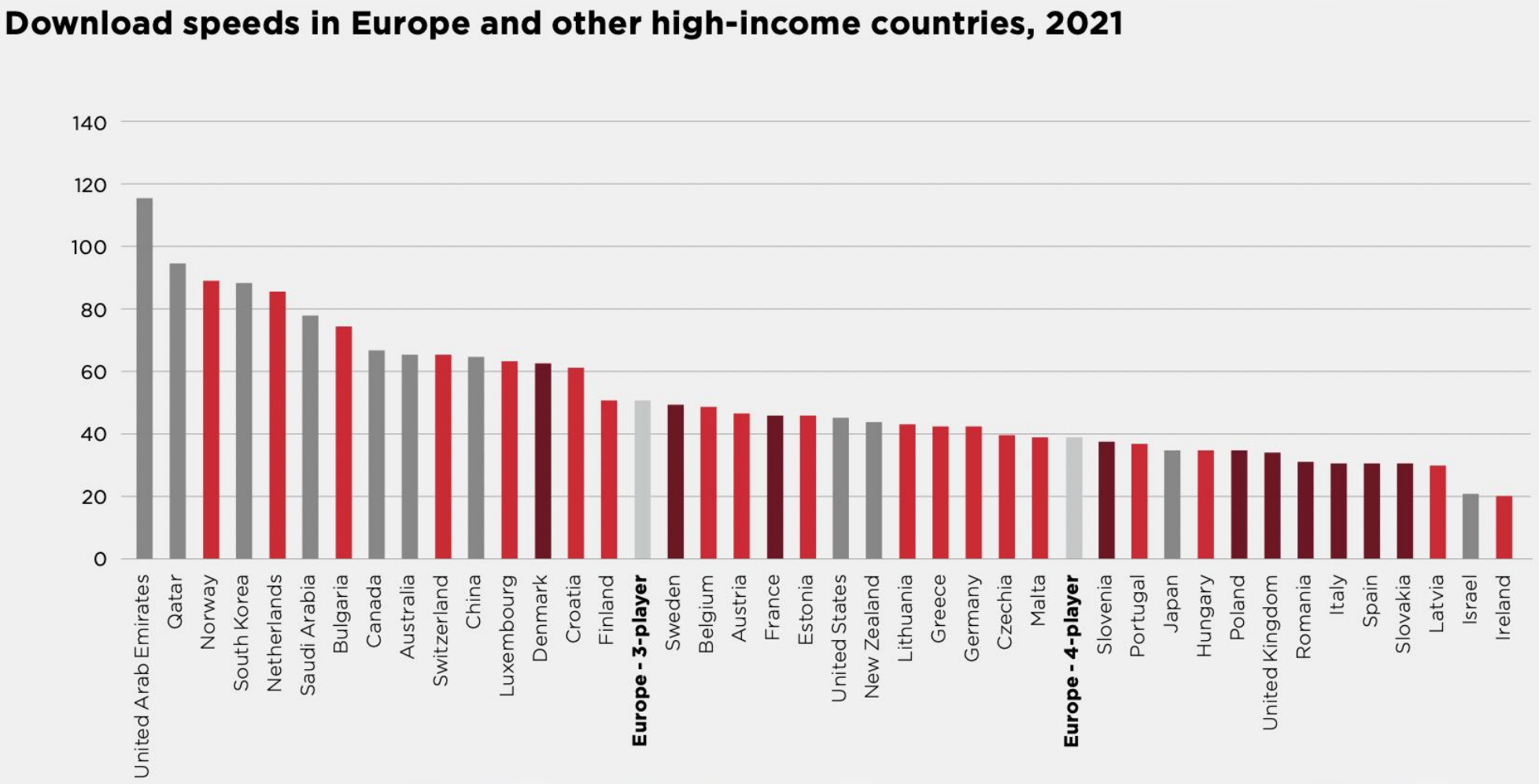
Luiz Felippe Zoghbi
Spectrum Engagement Director
GSMA

3G, 4G and 5G take up



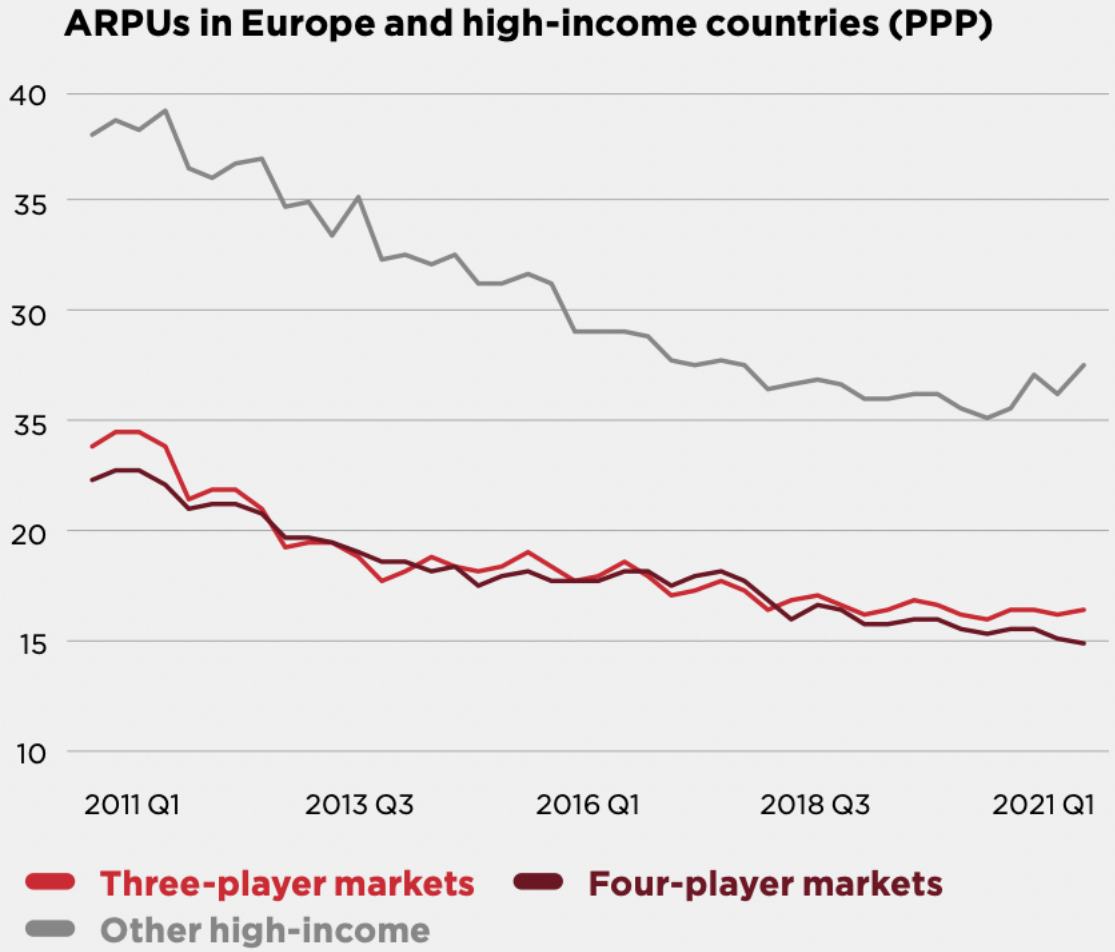
Source: Competition dynamics in mobile markets, GSMA

EU speeds



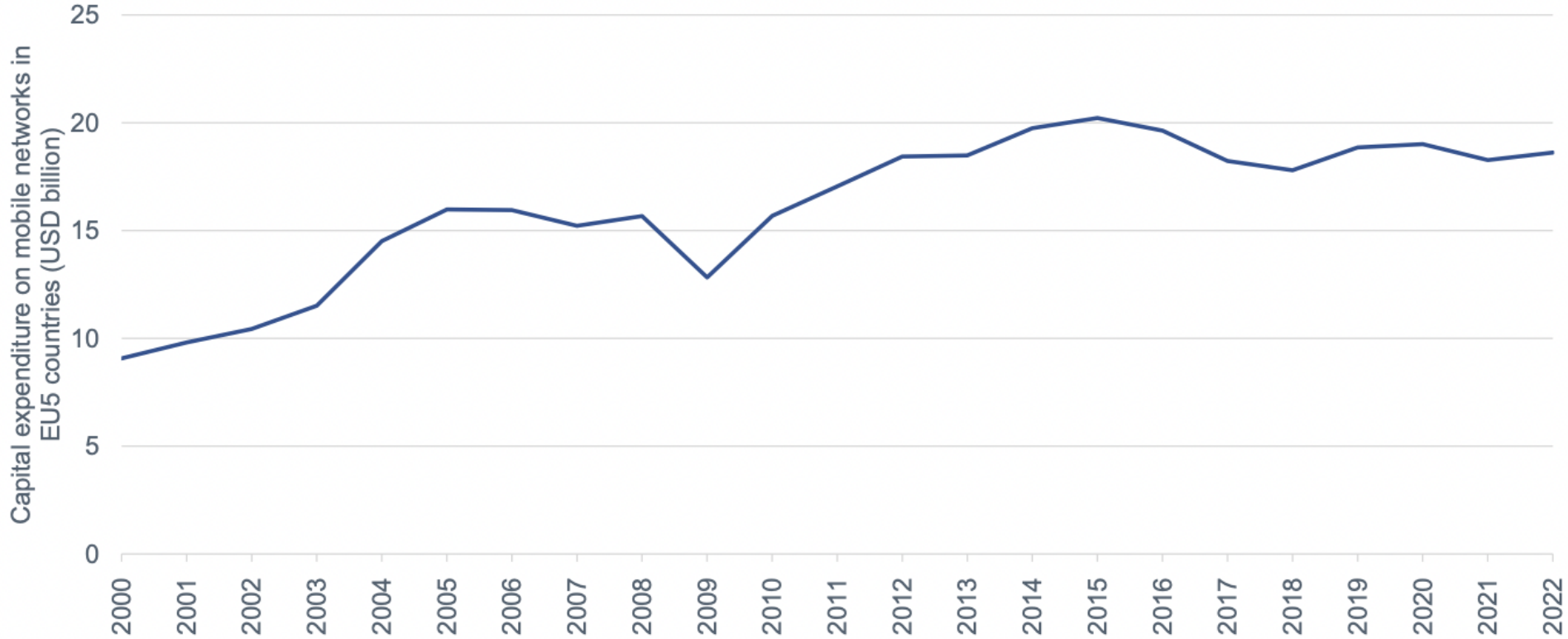
Source: Competition dynamics in mobile markets, GSMA

ARPU



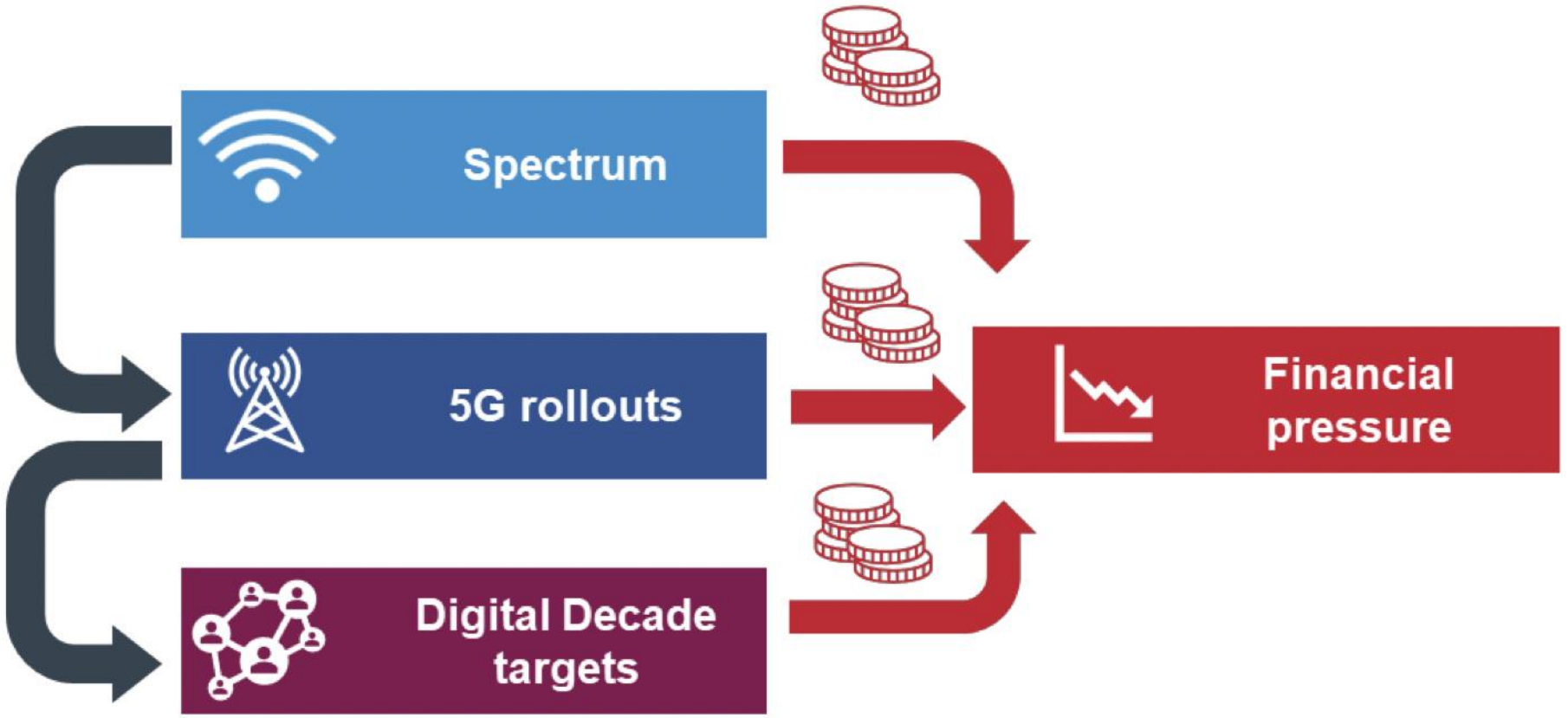
Source: Competition dynamics in mobile markets, GSMA

Capital Intensity in Europe



Source: Ensuring European spectrum renewals are aligned with Digital Decade targets, Aetha, Report for Ericsson

Financial Pressure



Source: Ensuring European spectrum renewals are aligned with Digital Decade targets, Aetha, Report for Ericsson

5G

Spectrum Needs

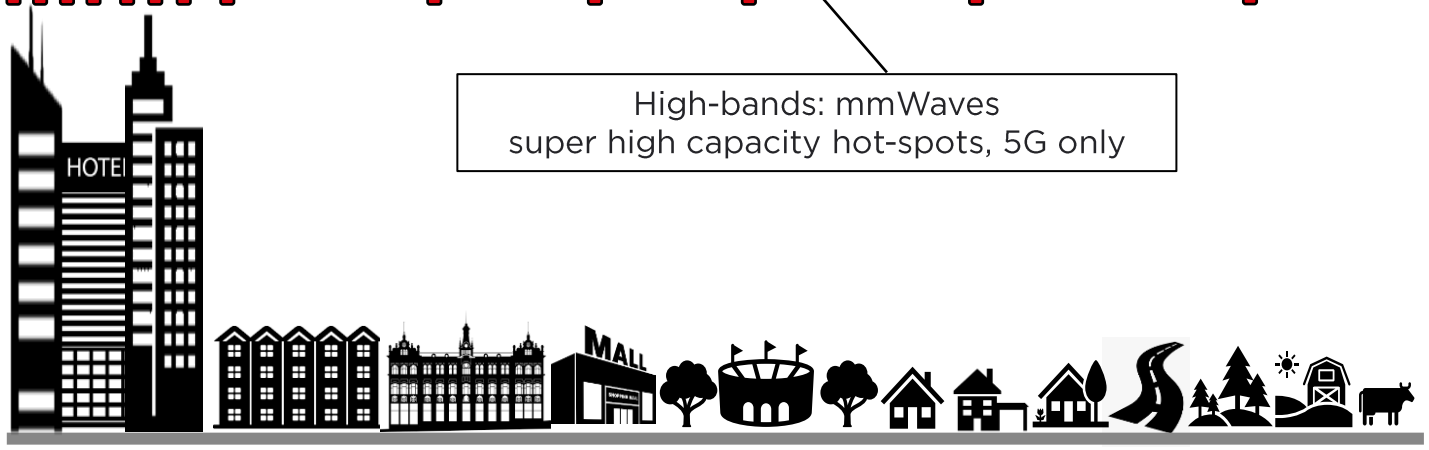
Bands

Sub-1 GHz bands: 600-900 MHz
deep indoor and rural coverage layer, legacy technologies and 5G

Lower mid-bands: 1.5-2.6 GHz
basic capacity layer, legacy technologies and 5G

Upper mid-bands: 3.5 GHz, 4.8 GHz, 6 GHz
city-wide speed coverage layer, 5G only

High-bands: mmWaves
super high capacity hot-spots, 5G only



Dense Urban **Urban** **Suburban** **Rural**

Needs

Demand always higher than supply

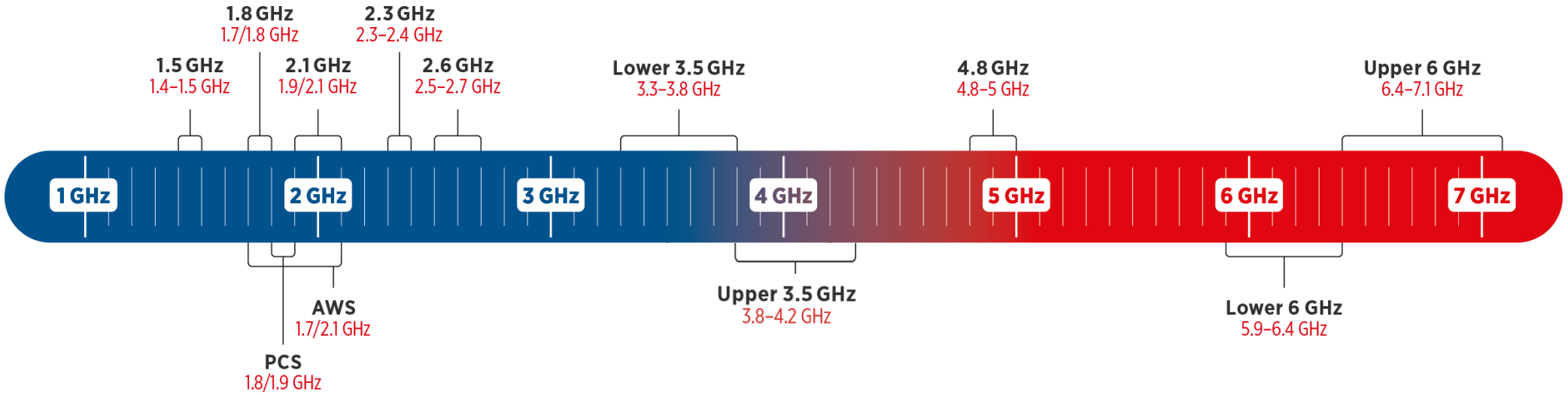
2 GHz

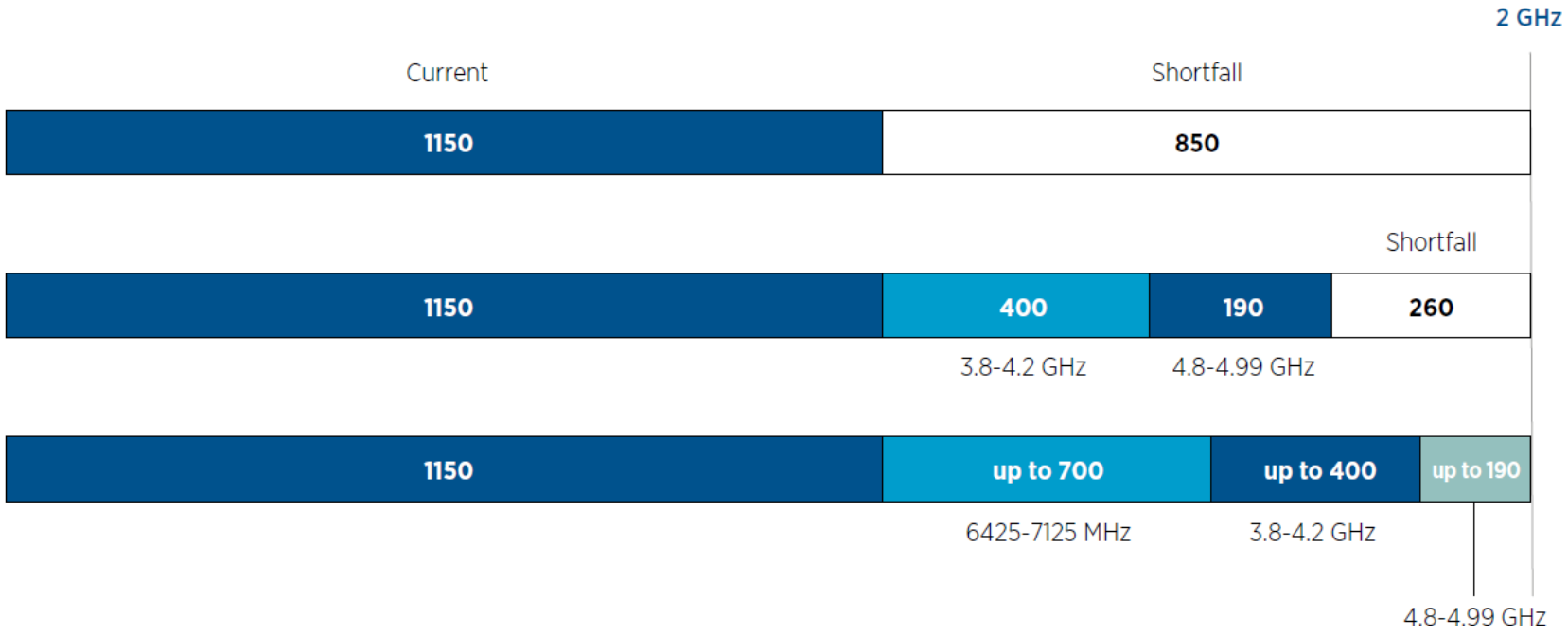
5 GHz

Low Bands

inc. 600 MHz

- Digital equality
- Rural Connectivity
- Rural Economic Growth


1.8 GHz
1.7/1.8 GHz
2.3 GHz
2.3–2.4 GHz
1.5 GHz
1.4–1.5 GHz
2.1 GHz
1.9/2.1 GHz
2.6 GHz
2.5–2.7 GHz
Lower 3.5 GHz
3.3–3.8 GHz
4.8 GHz
4.8–5 GHz
Upper 6 GHz
6.4–7.1 GHz
1 GHz
2 GHz
3 GHz
4 GHz
5 GHz
6 GHz
7 GHz
AWS
1.7/2.1 GHz
PCS
1.8/1.9 GHz
Upper 3.5 GHz
3.8–4.2 GHz
Lower 6 GHz
5.9–6.4 GHz


2 GHz
Current
Shortfall
1150
850
Shortfall
1150
400
190
260
3.8-4.2 GHz
4.8-4.99 GHz
1150
up to 700
up to 400
up to 190
6425-7125 MHz
3.8-4.2 GHz
4.8-4.99 GHz

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6 GHz

6.425-7.125 GHz

- Capacity for speed
- Lower network density
- Lower carbon emissions

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- Digital equality:
  - How will 5G and 6G reach all Europeans? What spectrum will be required to lower the digital divide?
- Financial Pressure:
  - How will investments continue to grow with lower ARPU and additional requirements? Can Spectrum for the right price support?
- Cleaner, greener future:
  - What is the carbon impact of lower power, smaller channel networks? Can macro-cell mobile help climate targets without spectrum?
- Is Europe competitive?
  - E. Asia, Middle East and North America all have robust spectrum plans. How will Europe keep up?