BCO Network

BCO Network WEBseries 17
The 5G Observatory – latest findings

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The European 5G Observatory

Developments as of end of 2024

Objectives of the 5G Observatory report

The European 5G Observatory is a monitoring facility designed to track progress in 5G technology and market developments across the EU and other regions worldwide.

The 5G Observatory offers:

- **Comprehensive data**: the Observatory covers a wide range of metrics, from network coverage to market developments
- **Easy comparisons**: across countries and metrics, to help identify trends and gaps
- **Transparency**: the 5G Observatory's methodology will explain how the data is collected and processed

Moreover, the Observatory contributes to tracking advancements towards the Digital Decade's connectivity targets and comparing progress across countries. In time, 6G early developments will also be reported by the Observatory.

What countries are covered:

- 27 EU Member States
- 20 additional countries
  - 9 EU candidate countries (Albania, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia, Turkey, and Ukraine)
  - 4 EU non member states (Iceland, Liechtenstein, Norway and the UK)
  - 7 international comparison countries (Australia, Brazil, China, India, Japan, South Korea and the United States)

Key metrics overview

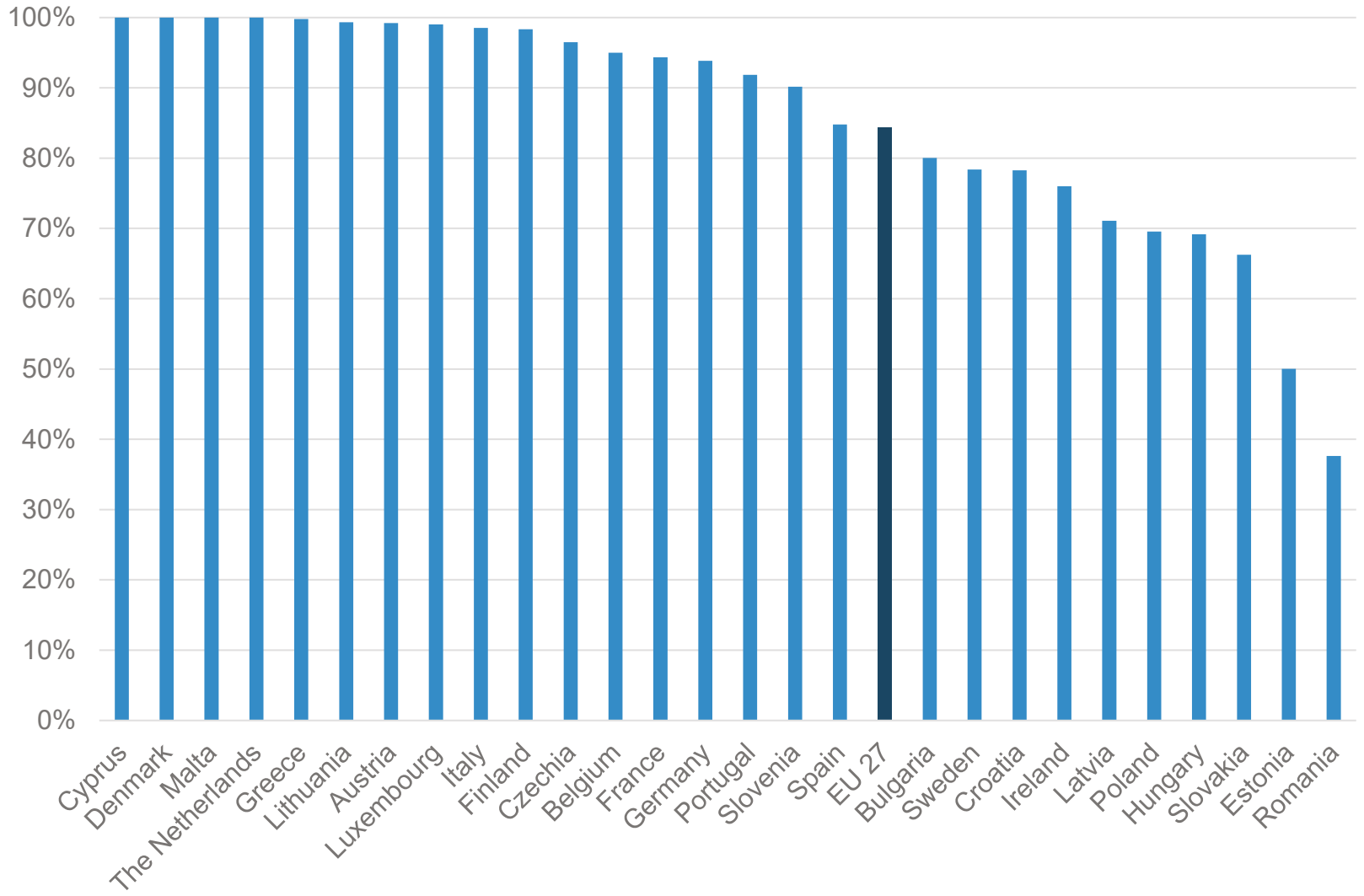
What information is available?

- **5G network coverage**: track 5G coverage at national level and explore rural and indoor coverage across different frequency bands
- **Deployment progress**: monitor the number of 5G base stations installed and learn about key milestones, such as standalone (SA) and non-standalone (NSA) network launches
- **Quality of service and usage**: check the availability of 5G-enabled devices, SIM card penetration rates, and mobile broadband adoption trends
- **Spectrum allocation**: see how radio frequencies are assigned, auctioned and shared for 5G use
- **Infrastructure investment**: track national investments in 5G networks and explore private networks and network-sharing initiatives
- **Market developments**: review operator market shares and assess the performance of major telecom equipment vendors
- **Policy developments**: learn about policy and legal developments affecting 5G
- **5G verticals**: learn about 5G private networks designed for specific industries or applications, and explore standalone 5G deployment, including its use in 5G corridors for connected and automated mobility (CAM)

Key questions raised in the 5G Observatory

1. Do we have comprehensive 5G coverage across the EU27?
2. Is 5G effectively reaching households and rural areas?
3. Is indoor coverage sufficient to guarantee consistent quality of service?
4. When did EU Member States launch Standalone 5G, and where do gaps remain?
5. How does 5G availability in the EU27 compare with global peers?
6. Has enough spectrum (including mmWave) been allocated and harmonised across the EU27?
7. Are investment levels in RAN and Core networks sufficient compared to other large economies?
8. To what extent are industries across the EU27 adopting 5G solutions?

5G geographic coverage in the EU27

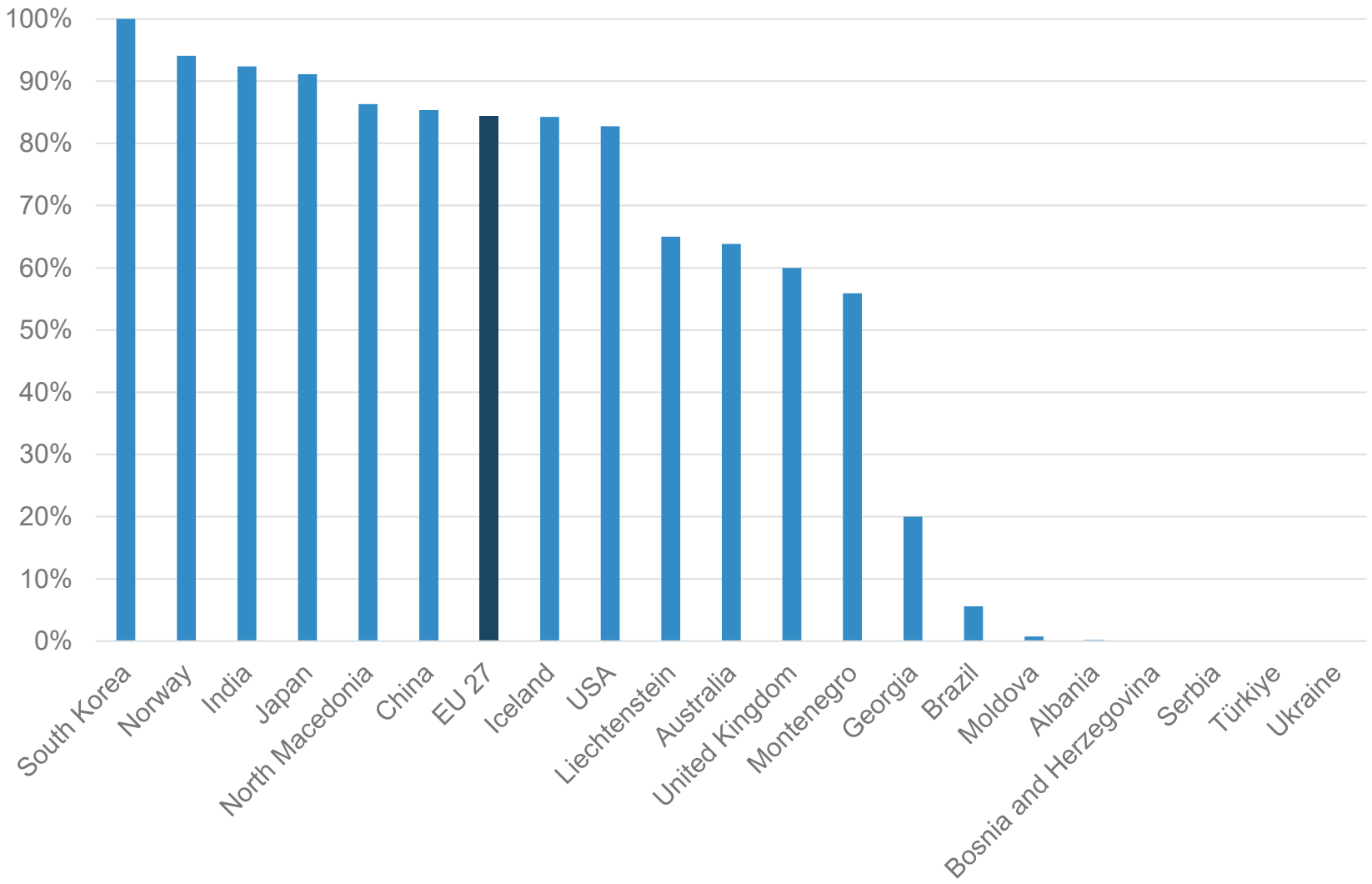


While the EU average of **84.4%** suggests strong overall progress, the gap between full coverage leaders and lagging countries is striking

- nearly **2/3rd** of the Union is close to saturation,
- a handful of states are still in the early stages of deployment.

This unevenness (with EU27 median coverage at **93,9%**) raises challenges for digital cohesion and competitiveness across the EU.

Worldwide comparison of 5G geographic coverage



Internationally, the EU27 stands 7th out of the 21 international countries

- One place behind China
- 2 places in front of the USA

South Korea has already reached country coverage in April 2024

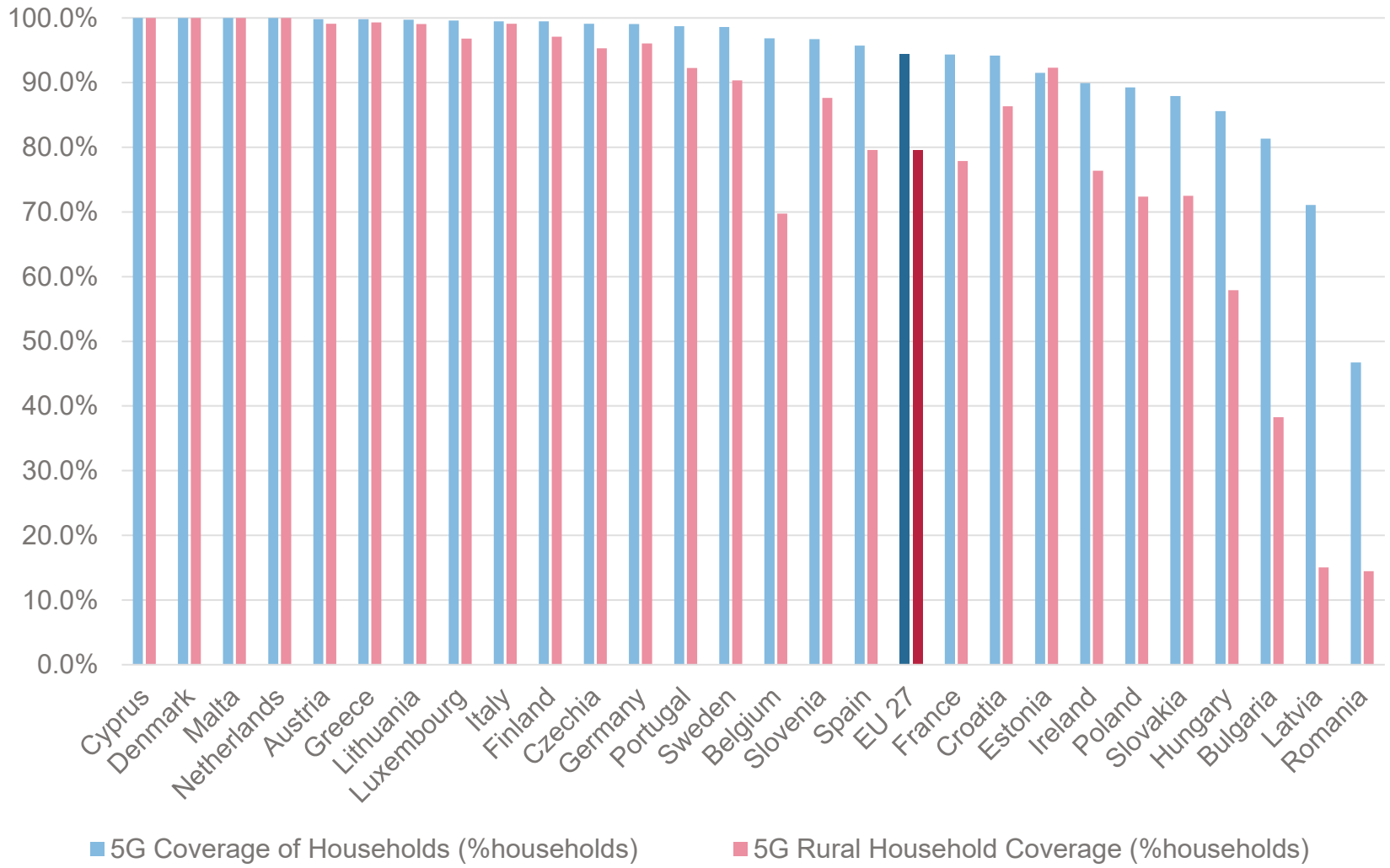
Close behind, India (92.3%), Japan (91.1%), and Norway (94.1%)

Countries such as Australia (63.9%), the UK (60.0%), Liechtenstein (65.0%), and Montenegro (55.9%) are in a middle bracket.

Albania (0.2%) – launched in September 2024 – Moldova (0.7%), Brazil (9.0%), and Georgia (20.0%) show minimal deployment.

Bosnia Herzegovina, Serbia, Turkiyë and Ukraine had yet to launch 5G

Comparison of 5G coverage of households vs rural coverage (EU27)

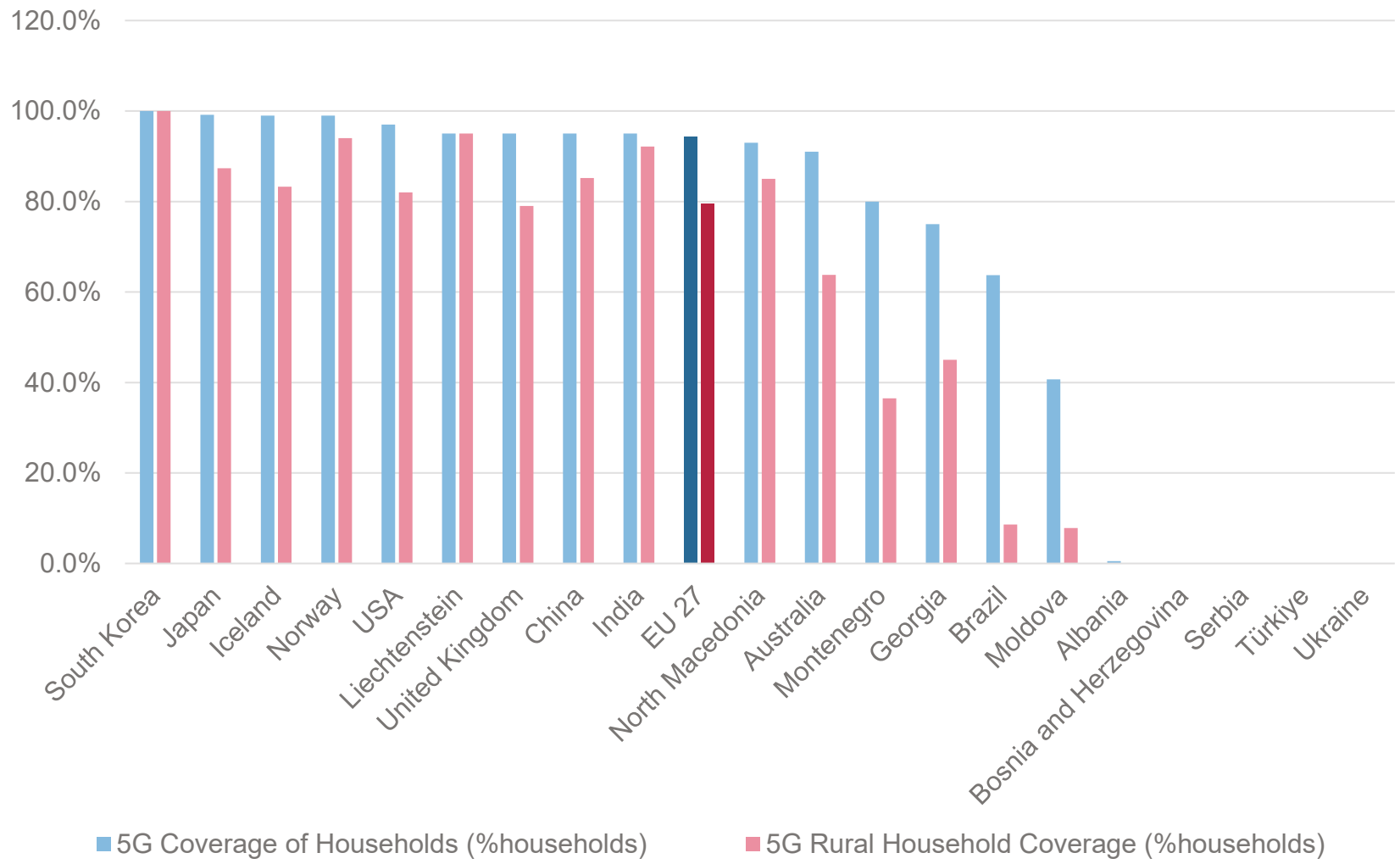


While the EU is approaching universal household coverage overall, rural households remain systematically disadvantaged.

The divide is small or non-existent in leading countries like Denmark, Cyprus, and the Netherlands, but dramatic in others such as Hungary, Bulgaria, Latvia, and Romania.

Bridging this rural gap is crucial if 5G is to serve as a foundation for inclusive digital transformation.

International comparison of 5G coverage of households vs rural coverage

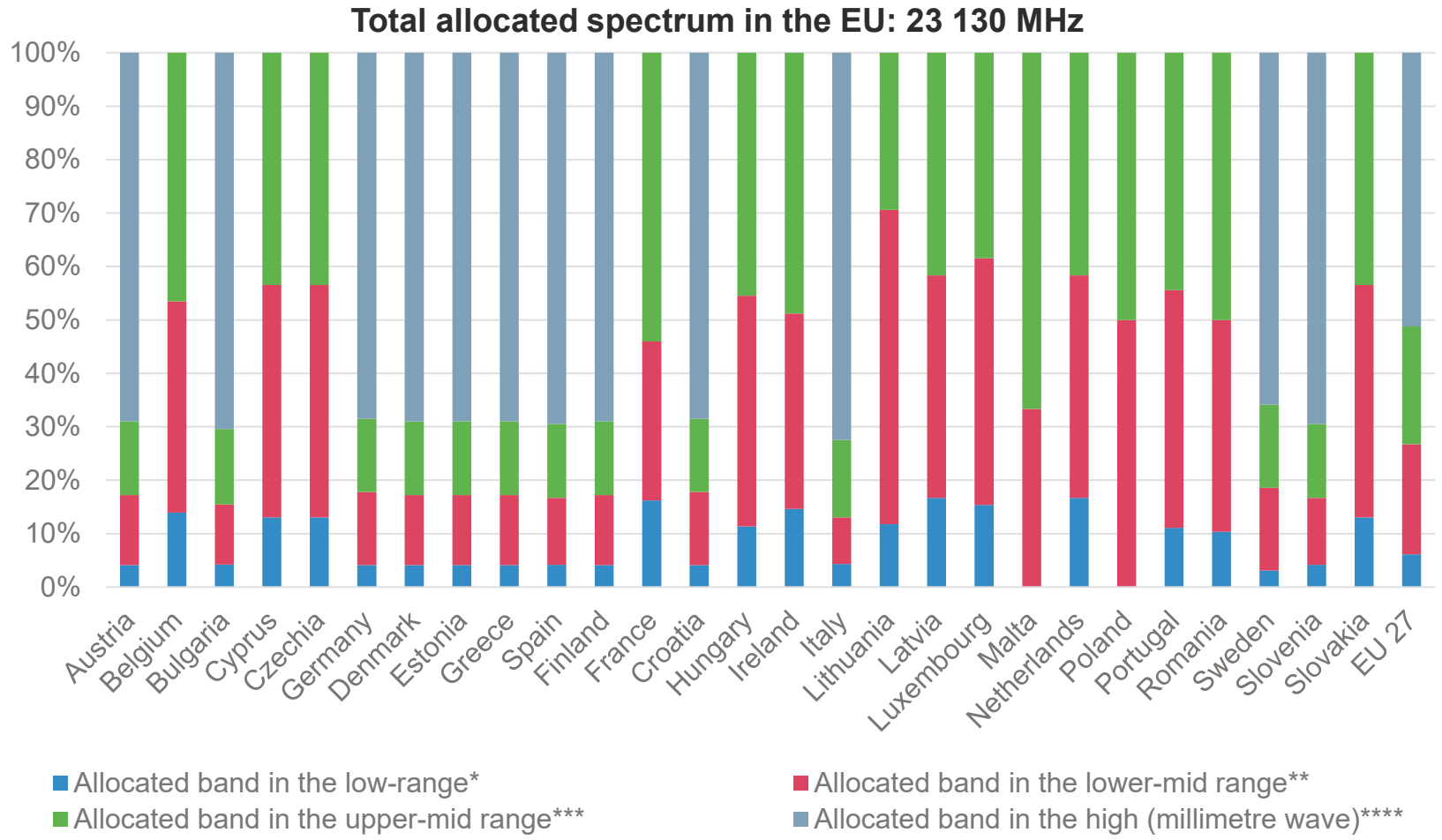


Europe's challenge is not urban households (where coverage is nearly universal) but rural rollout, which still falls short compared to the most advanced global peers.

- EU27 is globally competitive on household coverage (94.3%), close to China, the US, and India.
- Rural households are the weak spot: at 79.6%, the EU trails leaders like South Korea, Norway, and India, where rural coverage is above 90%.

The digital divide is widest outside the EU in countries like Brazil, Moldova, Montenegro, and much of the Western Balkans, where rural areas are barely connected.

Allocated spectrum by band in the EU



* In the EU: 703-788 MHz; Outside the EU: 450 - 960 MHz
** In the EU: 3.4-3.6 GHz; outside the EU, 1.4-3.599 GHz
*** In the EU: 3.6-3.8 GHz; outside the EU: 3.6-4.2 GHz
**** In the EU: 24-27 GHz; outside the EU: 24-60 GHz

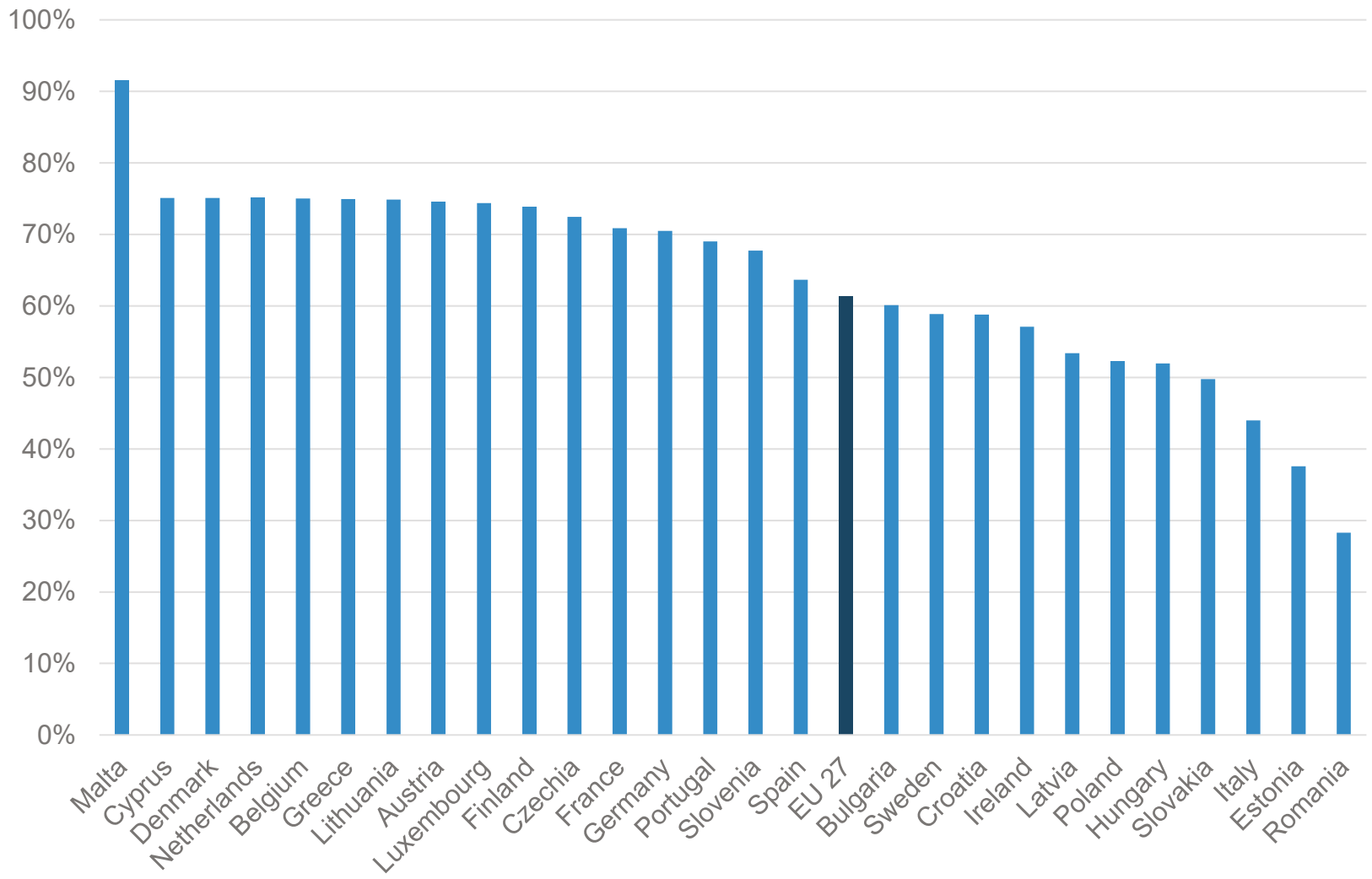
The EU27 has a balanced mid-band strategy but a thin low-band layer, limiting indoor penetration.

Countries with large allocations across all bands (Germany, Spain, Austria, Finland) are better placed for long-term leadership.

Countries with low total allocations and weak low-band presence (Romania, Malta, Ireland, Poland) face structural disadvantages for indoor and rural 5G.

Overall, Europe risks being "mmWave heavy on paper but indoor weak in practice" unless low-band rollout is accelerated and indoor infrastructure (small cells, DAS) is pushed forward.

Indoor coverage: the real problem (EU27)



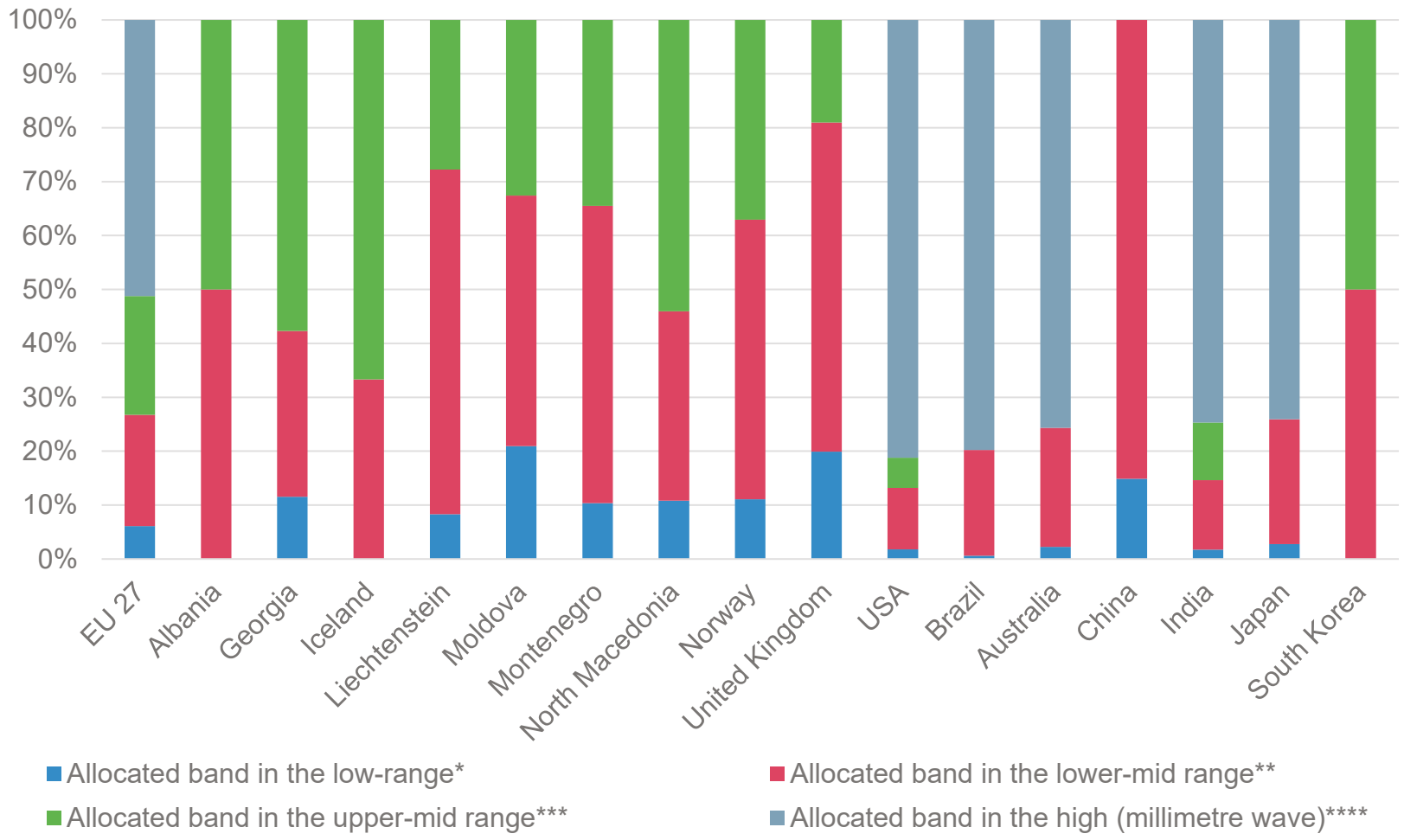
The EU27 average (61.3%) highlights that indoor coverage is far weaker than household coverage (94.3%).

Small and compact countries (Malta, Cyprus, Denmark, Netherlands) outperform, since fewer base stations are needed to achieve full indoor reach.

Larger economies like Germany and France have pushed indoor coverage above average, but gaps persist in rural and older urban buildings.

Eastern and Southeastern Europe lag far behind, with Romania, Estonia, and Slovakia showing how late rollout, lower investment capacity, and more challenging infrastructure environments hinder indoor penetration.

International comparison of allocated spectrum by band



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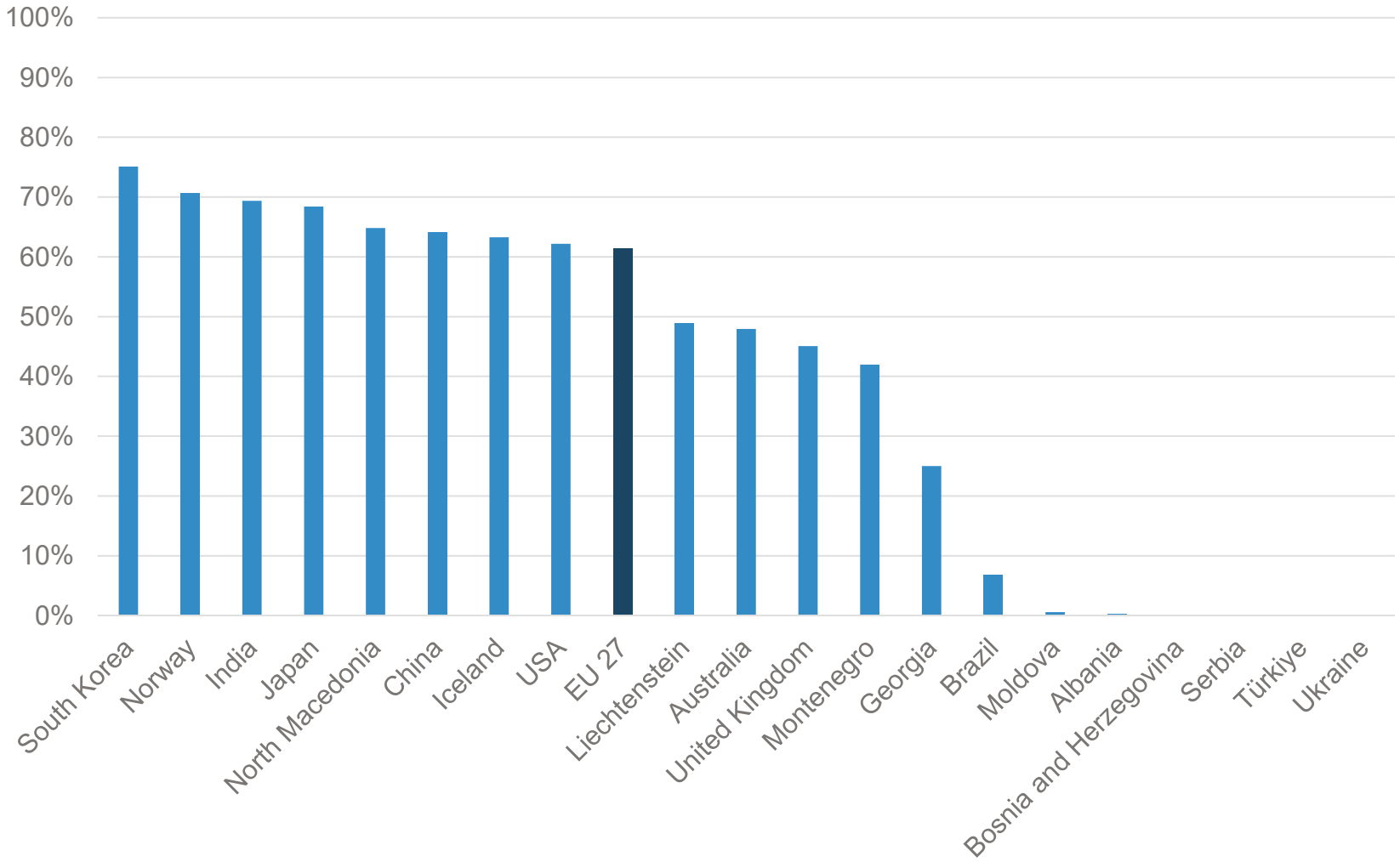
- EU27 is mmWave heavy (51%) and low-band light (6%), which explains why Europe looks strong on paper but weak on indoor/rural reality.
- Asia shows two models:
  - China/Korea: mid-band centric, driving strong indoor coverage.
  - Japan/India: mmWave heavy, with coverage challenges but high potential capacity.
- USA and Latin America: mmWave skewed, leading to flashy speed demos but weaker household/rural reach.
- Norway and UK: show alternative models with more low/mid balance, which aligns with their stronger indoor and rural performance compared to EU average.

Indoor coverage: the real problem (international comparison)



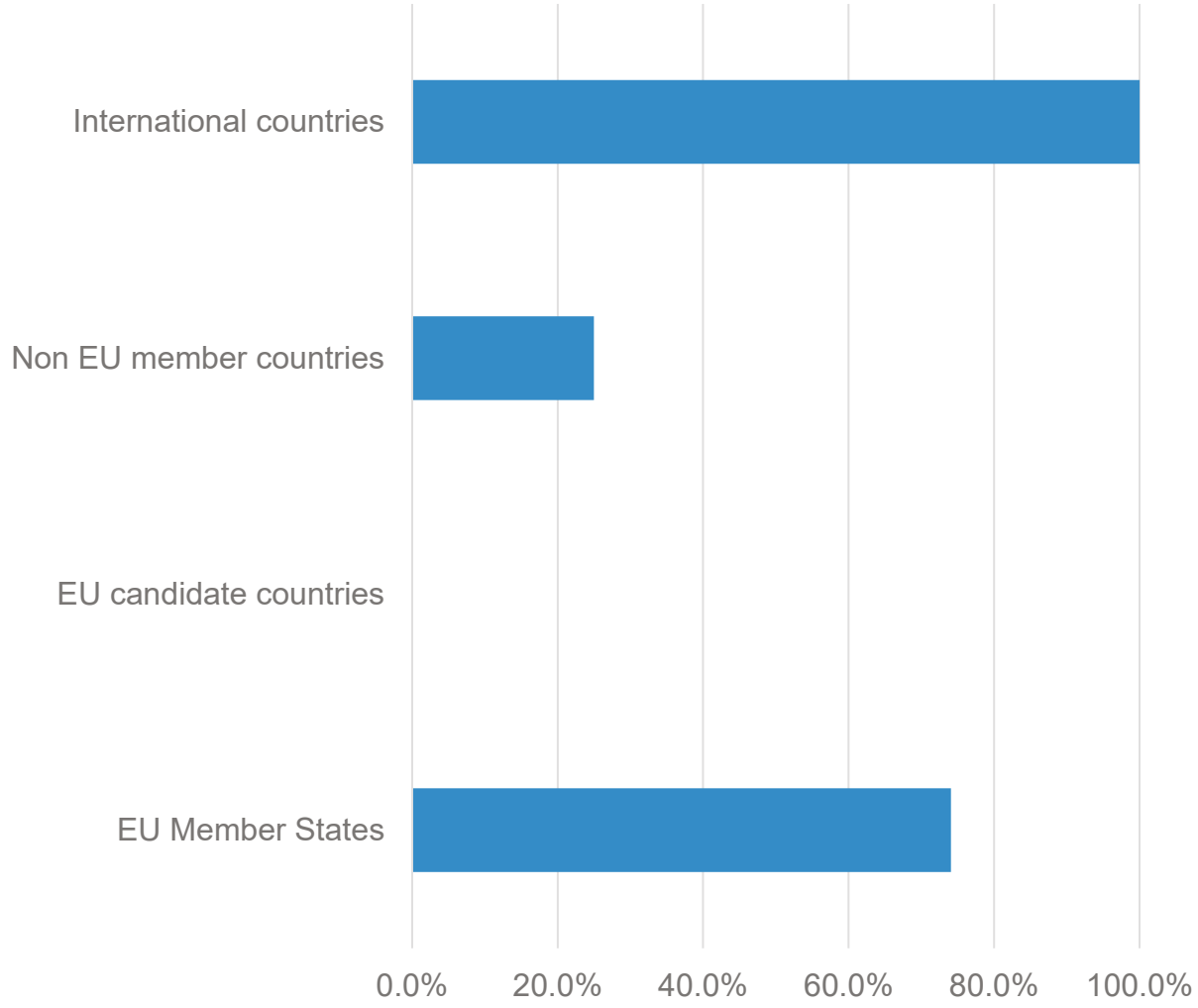
The EU27 average (61.3%) places Europe in the middle of the global pack:

- behind Asia's leaders (South Korea, Japan, India, China) and Norway,
- but ahead of countries like the UK, Australia, and most of the Balkans.

The real global benchmark is Asia, where indoor coverage consistently exceeds 65%.

The EU's challenge is to narrow the gap with Asia's frontrunners while maintaining its advantage over regions where indoor coverage is still minimal.

Launch of 5G Standalone



All 7 of the international countries had launched 5G Standalone by end 2024

- as early as 2020 in USA and China
- in 2021 in Australia, Japan and South Korea
- and finally in 2022 in Brazil and India

The EU's fragmented rollout means Europe as a whole lags the global 5G SA pioneers, despite having some advanced individual markets like Germany and Finland. In comparison to international peers, only 20 EU Member States (74% of the 27) had launched 5G SA by end 2024, to the exception of Belgium, Cyprus, Czechia, Croatia, Lithuania, Luxembourg and Malta.

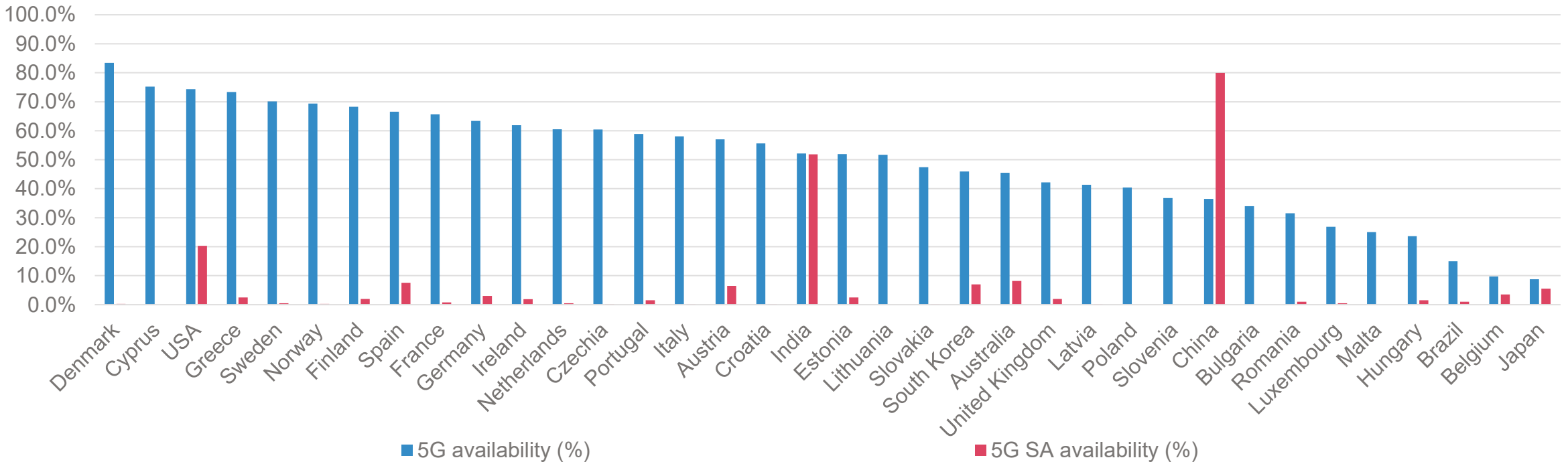
Only the UK had launched 5G SA among the non-EU member countries and none of the candidate country.

Countries that moved earlier are already piloting advanced use cases, such as network slicing, ultra low latency, reliability and uplink performance, VoNR and enterprise competitiveness.

Moving to the demand-side: 5G NSA and SA availability

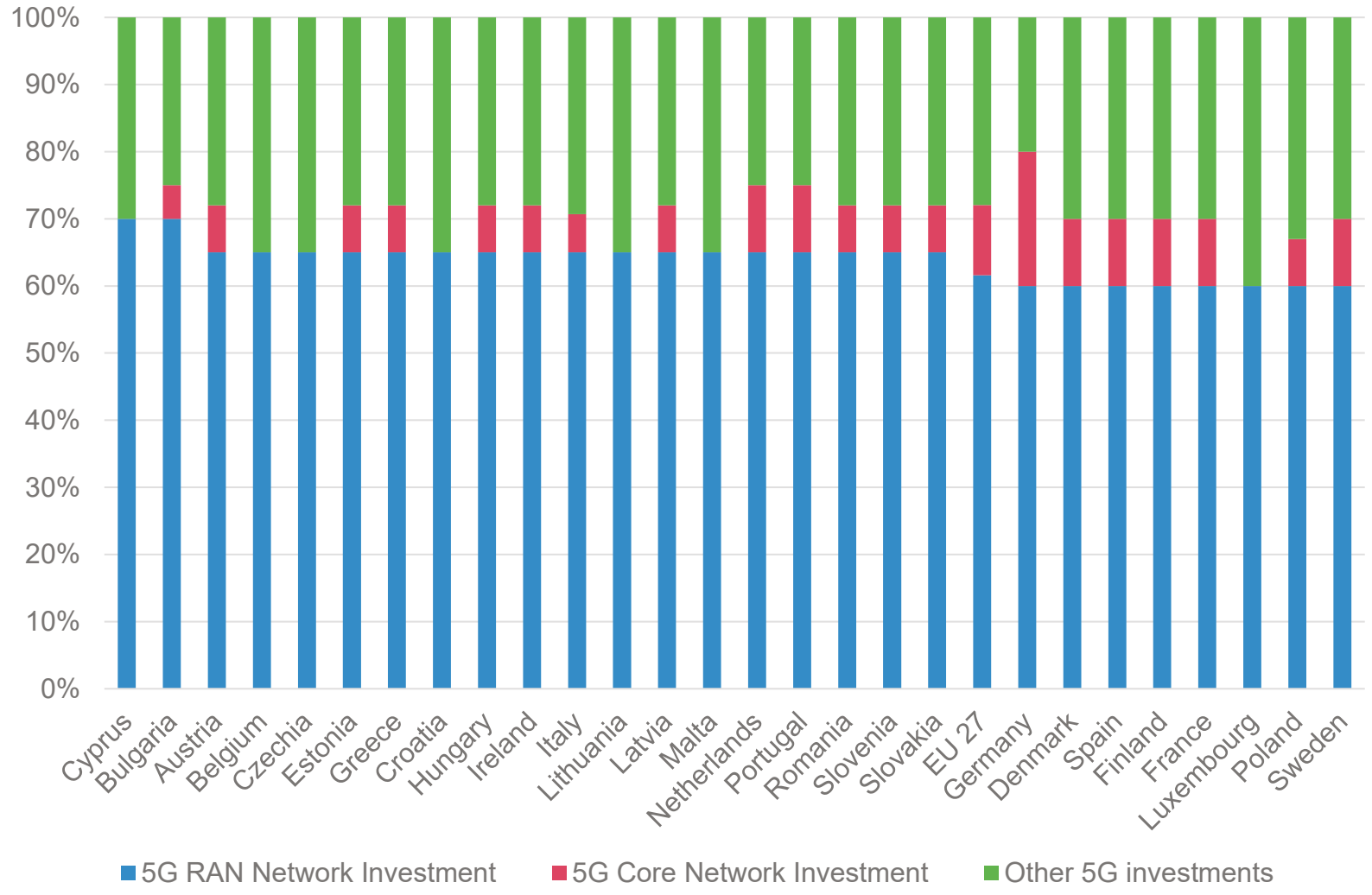
Europe has achieved widespread 5G coverage on NSA, but is lagging heavily in SA rollout, which is where advanced features (low latency, slicing, enterprise use cases) become possible.

Compared internationally, the EU is mid-table on total 5G coverage but near the bottom on SA. The US, China, and India have pulled ahead, and even smaller economies like Australia are ahead in SA adoption.



Availability is how often users are really on 5G (NSA or SA). Sources come from Ookla reports or from an estimate based on OpenSignal reports

Comparison in RAN/Core investments in the EU



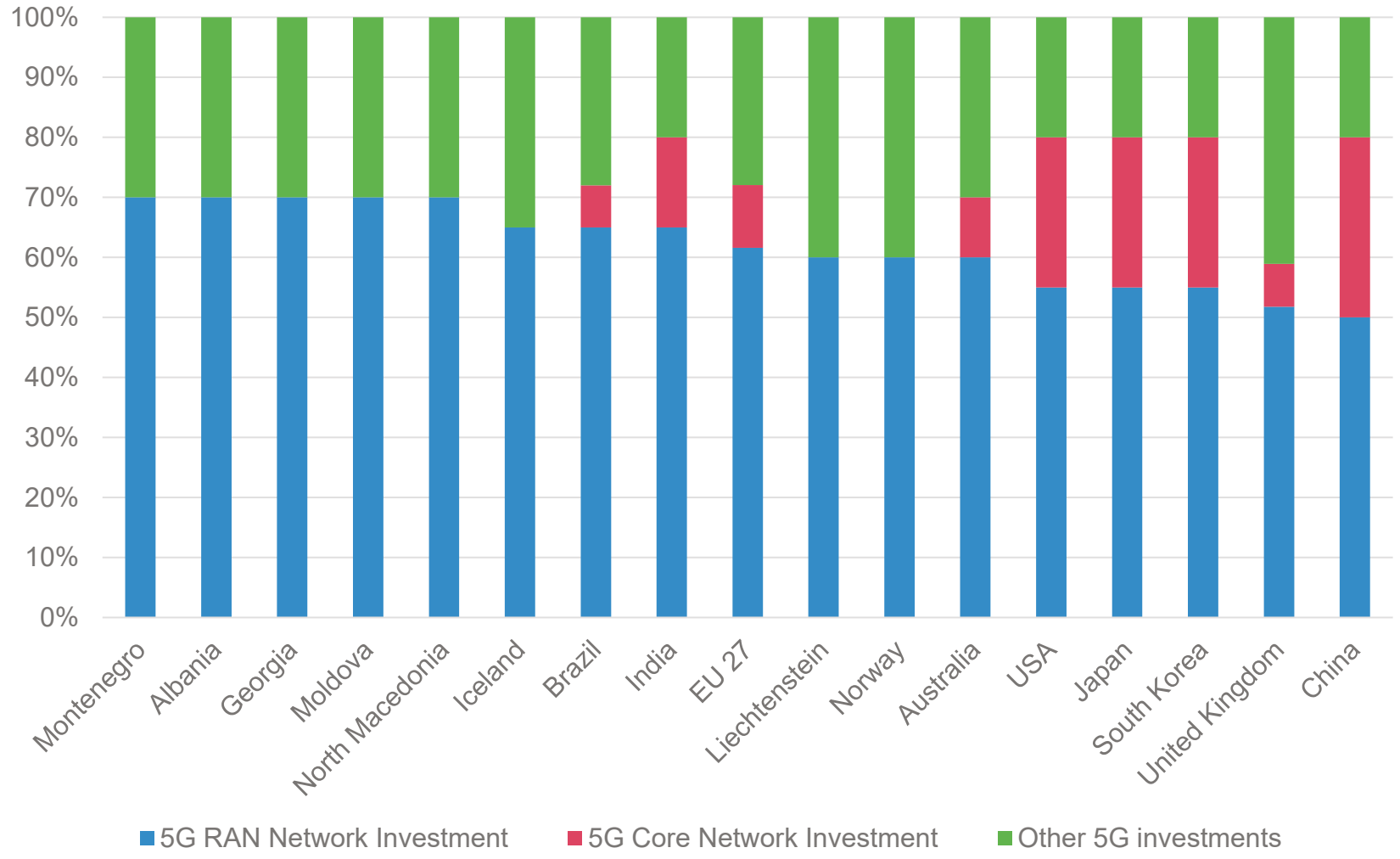
EU27 average investment mix:

- 62% RAN (radio access networks – base stations, antennas)
- 10% Core (new 5G standalone cores, cloud-native software, automation)
- 28% Other (spectrum fees, fibre backhaul, IT upgrades, site infrastructure)

Germany stands out

- With 20% of spend on core network, it's better positioned for SA and advanced services (network slicing, low latency).

International comparison in RAN/Core investments



Investments choices show different strategies:

- EU and Latin America have opted for a coverage-first, SA late.
- India is more balanced and directly leapfrogged into SA.
- US, Japan, South Korea, China: are heavily investing in core networks in line with their early SA leaderships.
- Western Balkans/small states put coverage-first.

Conclusion on the state of 5G in the EU at the end of 2024

By the end of 2024, the EU has delivered wide 5G coverage but shallow 5G depth. Europe is not falling behind on access, but it is lagging badly on Standalone, which unlocks the real economic and industrial promise of 5G.

Strengths	Weaknesses
Broad coverage achieved: • With >94% household coverage and >84% geographic coverage, the EU has succeeded in ensuring most citizens have access to 5G signals. • On this metric, Europe is globally competitive.	**Indoor and rural gaps:** • Indoor coverage averages only 61%, and rural household coverage 79%. • Both trail Asia's leaders (South Korea, Japan, India, Norway), where rural and indoor exceed 90%.
Strong in mid-band spectrum: • The EU's heavy reliance on the 3.4–3.8 GHz mid bands has enabled good urban and suburban performance • This places the EU ahead of the US and roughly on par with China for basic coverage	**Slow 5G Standalone adoption:** • While the US (20% SA availability), India (>50%), and China (80%) already have broad SA, • most EU markets remain at <3% SA availability, with only Spain and Austria slightly higher.
Some leaders emerging: • Countries like Germany, Finland, Spain, Austria are pushing early SA deployments and stronger spectrum portfolios.	**Investment bias:** • The EU average investment mix (62% RAN, 10% Core) shows a coverage-first, core-light strategy. • This has delivered footprint but slowed innovation in advanced 5G services (slicing, low latency, VoNR).

THANK YOU

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