Mid-band scarcity creates new dilemmas for regulators

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Analysys Mason attended the RCR Live event in London on 25 April 2023. The headline of the event was *Telco reinvention: navigating the path from telco to techco*. This event had a strong focus on how the telecoms industry must make sustainable adjustments in order to adapt to current and future external macro pressures including climate change and the turbulence of the global financial system while, at the same time, try to modernise their networks and business models.

The role of spectrum management by regulators was also highlighted as key to telco reinvention, and there was a dedicated panel discussion involving the spectrum departments from three European regulatory bodies. This included UK's Ofcom, Germany's Federal Network Agency (BnetzA) and France's National Frequency Agency (ANFR). Representatives from each regulator shared updates on their frequencies, initiatives, configurations and priorities for spectrum assignment to support new use cases and services.

Introducing national spectrum sharing initiatives could help to effectively squeeze more players within the available spectrum

In the 5G era, we are seeing more competition for spectrum access as a greater number of industries are moving to digitise their systems, often using wireless technology as a key enabler. Non-telco industries, such as manufacturing and transport, are requiring access to spectrum to enable private campus/facility networks, or for specialised wide-area connectivity. Regulators in Europe are setting aside spectrum for private 4G/5G networks, mostly in the 3.8–4.2GHz mid-band. The panel members representing Ofcom, BnetzA and ANFR, all disclosed the number of licences they have allocated to non-telco industries.

- **France.** ANFR has set aside 2.6GHz TDD to 6GHz spectrum for non-telcos to support the development of private 4G networks and has made local licences in the 3.8–4.2GHz available on a trial basis since 2019.
- **Germany.** BnetzA granted 312 licences (licences per company) to non-telcos in the 3.7–3.8GHz band since 2019.
- **UK.** Ofcom granted around 800/900 licences (licences per site) to non-telcos in the 3.8–4.2GHz band since 2020, since they introduced the shared access licences (SAL) initiative to support the deployment of private networks.

However, the mobile industry is facing challenges surrounding mid-band spectrum scarcity, and the ability to squeeze more players within the current available spectrum is becoming increasingly difficult. Regulators must also consider whether allocating spectrum 'set asides' to other industry verticals undermines the spectrum requirements for the public network as operators, such as Deutsche Telekom in Germany, have argued. Going forwards, the spectrum capacity needed to support the speeds for future use cases, such as the metaverse, will need to be considered. It is important that assigning spectrum to telcos and non-telco players follows a highly efficient and economical rational.

A range of national regulators are introducing and trialling spectrum sharing initiatives, which seek to improve the management of spectrum going to telcos and non-telcos. For example, Ofcom's Shared Access Licences (SALs) tries to strike a balance between maximising spectrum use while also safeguarding access to spectrum for stakeholders. Ofcom has tried to increase the usefulness of the shared access licence platform (after receiving feedback that the process lacked transparency and certainty in accessing spectrum) and plans to implement an automated application system by April 2024. Similarly, the Indian regulator Telecom Regulatory Authority of India (TRAI), has proposed enforcing rules that allow telcos to be secondary users of spectrum that was assigned for non-telco users on a primary basis. This followed a disagreement between operators and tech companies over fairness in spectrum assignment. Bharti Airtel and Vodafone have voiced their support for the new proposal.

Regulators discussed potential spectrum frequencies to support future mobile coverage and capacity needs

The spectrum requirements of next-generation technologies and mobile network developments (such as 5G-advanced and eventually 6G) was a key topic at the conference. The use of higher spectrum bands was discussed as a solution, particularly for helping to reduce the current pressure on lower mid-band spectrum. However, the use of these higher spectrum bands within the mobile network are either still under debate and/or currently in trials and R&D stages.

- **6GHz** band (5.925–7.125GHz). The upper 6GHz (6.425–7.125GHz) represents one of the largest remaining single blocks of mid-band spectrum available for licenced mobile services and is often seen as a spectrum solution for 5G expansion. The upcoming ITU's World Radiocommunications Conference (WRC) 2023 (to take place between 20 November and 15 December 2023), will consider the use of the upper 6GHz band and its importance as a cost-effective and near-term option for satisfying the growing spectrum demands for 5G. The upper band is currently available on an unlicenced basis in a few countries and most national regulatory authorities are waiting for the outcome of the WRC-2023 before proceeding to assign the upper band to mobile operators, with most not expecting 6GHz to be available before 2030.

  Several countries are still considering the use of the 6GHz band, including China, where the licensing of the full 6GHz band (upper and lower) is being considered for mobile.

  Regulators will also need to consider the need for licensing 6GHz for Wi-Fi (particularly for new Wi-Fi 6E technology), as well as mobile, and which connectivity standard will deliver the greater value.

- **Millimetre wave (mmWave)** spectrum (26–40GHz) was viewed as being underutilised but a good option for providing the speed and capacity required for premium services, although its propagation challenges limit its widespread use in the public mobile network. Despite the limitations, mmWave spectrum has already been assigned as a premium band for 5G in many countries including Singapore, Spain and the USA. Other countries are still in the process of assigning it. For example, Ofcom confirmed that it is making 6GHz of mmWave spectrum available for mobile technology, including 5G (although, consultation on the auction design and the conditions for citywide/local licences are to be held).

- **Sub-terahertz** spectrum (100–300GHz) was briefly mentioned by the regulators for supporting the higher data rates expected by 6G networks. However, how these frequencies might be deployed together with the spectrum and architecture used in today's mobile networks is still a subject for debate.