

# Greater flexibility in spectrum use: do the benefits outweigh the risks?

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Many spectrum regulators are aiming to achieve greater flexibility in spectrum use, both to encourage innovation and to find more-novel ways to enable new services to be launched without the need to reassign frequencies from their current use.

Analysys Mason was commissioned by the Australian Communications and Media Authority (ACMA) in 2017 to assess the market opportunities – and the risks – associated with more-flexible, market-based management approaches for spectrum. This article summarises some of the key questions and concerns addressed in this study.

## An overview of Analysys Mason's ACMA study

Trends such as the growing demand for spectrum, advances in wireless technologies and changing worldwide supply chains (with expectations of rapid growth of the Internet of Things (IoT)) have emerged, prompting a need to consider changes to the spectrum-management framework. In Australia, the government has proposed a programme of spectrum reform, and new spectrum-management legislation is now being implemented to replace previous legislation. The new legislation gives the ACMA new powers aimed at responding to rapid changes in market demand and the latest developments in wireless technology, including trends towards more-dynamic operation of wireless systems.

A key feature of the new legislation is migration to a single licensing system. The overall aim of this legislation is to give the ACMA greater flexibility to adapt the issuing of licences and licence conditions to meet the demands of new technologies, and to improve the scope for changes of spectrum use to occur. The inclusion of a 'spectrum authorisations' option within the new framework could potentially create opportunities for different applications, with different requirements for spectrum access to coexist in the same spectrum. This might also facilitate emergence of the latest international wireless technological advances in dynamic spectrum access (DSA) in the Australian market, such as use of database systems that will determine operating parameters for concurrent use of spectrum, by reference to existing spectrum use and sharing conditions (for example, geo-location systems).

As input to its strategy for spectrum management reform under the new legislation, the ACMA asked Analysys Mason to assess best international practice in spectrum management, and to consider how best practice, market-based approaches to spectrum management might be extended in Australia towards achieving more flexibility in use as a means of meeting future spectrum demands. The study was completed in June 2017 and is intended to form an input to the ACMA's policy thinking in relation to prioritising new spectrum management approaches under the new legislation.

Within the study, we considered the appropriateness of applying flexible management approaches to different types of spectrum. Where market trends are clearly pointing towards re-assignment of key spectrum bands (for

instance, due to under-utilisation), we also considered how regulators might weigh up the trade-offs between re-assignment, compared with moving to a position where more bands might be shared.

## International best practice for spectrum management

As part of our study, we surveyed the approaches to spectrum management used in eight jurisdictions worldwide. From this survey, we selected examples of markets where regulators are implementing market-based mechanisms for spectrum assignment, and have evolved these towards more-sophisticated market-based spectrum assignment and sharing approaches. We focused primarily on sharing and flexible use that might potentially be facilitated by technological co-ordination techniques, such as DSA.

We found that current international trends highlight the importance of achieving more-flexible and dynamic use of spectrum as one mechanism of meeting future spectrum demand. However, the costs and timescales involved in adopting new market-based mechanisms facilitated by technological solutions (for example, the use of geo-location databases to manage the use of spectral gaps in real time, and to control the operating parameters of systems to avoid interference with other spectrum users in the same location) should not be underestimated, and represent a key barrier to wider adoption.

We also considered the risk that the potential for interference will rise with increased numbers of users sharing the same spectrum. The extent to which this risk becomes unmanageable by the market is dependent on the approach to sharing (for example, via shared-use licences that the regulator enforces, or via a class licence or licence exemption, where many devices and systems are operating in an uncoordinated way). An important conclusion from our assessment was that the innovation goals that regulators are seeking to achieve from flexible spectrum use will be compromised if the risk of radio interference cannot be managed by the market. In addition, there is likely to be less willingness to invest in deploying services where predictability of high-quality spectrum access is absent.

We noted that the success of more-sophisticated market mechanisms for spectrum sharing will rely on the availability of real-time information on spectrum management and the interference environment, to facilitate frequency co-ordination and interference avoidance. The means of providing and maintaining this information in real-time are still being developed.

## Finding the right balance for developing new spectrum management frameworks

We found that finding the right balance – between providing flexibility for new market players and ensuring predictability (including a stable competitive environment) for traditional mobile and wireless operators – is one of the challenges that the ACMA and other regulators potentially face in developing new management frameworks for spectrum. Where large-scale investment in new nationwide networks is required (for instance, within the mobile market), there may still be a need for operators to have individual licences that provide exclusive use of spectrum, to avoid undermining investment certainty through a lack of guarantee concerning spectrum quality.

We have also noted that, although flexibility in spectrum use is a useful general attribute, it is less important in periods when market developments are clearly pointing towards reassignment of key spectrum (for example, towards mobile communications), as often seems to be the case today. Notwithstanding this, it is likely that, without sharing, finding sufficient amounts of contiguous spectrum as desired for 5G ‘new radio’ radio access networks (5G RAN) (for example, in multiples of 100MHz) will be challenging to achieve. Given that the

frequency bands being considered internationally for 5G are in use by various satellite services where substantial investment in new satellite technology has been made (for example, 3.3–4.2GHz, 26GHz and 28GHz), there will be a need to implement appropriate sharing provisions between 5G and the existing services in those bands.

To address these complex trade-offs, best practice in established spectrum management techniques will be relevant into the future, to enable regulators to prioritise their choices of management approach from the range of mechanisms that might be considered. This best practice includes establishing demand for spectrum, assessing alternative bands/bandwidths of interest for new uses, and identifying options for making spectrum available (as well as potentially consulting on these options with industry). This best practice can be facilitated by open decision making, including publishing materials online, consulting with industry and conducting cost-benefit assessments.

Analysys Mason provides a range of spectrum consulting services, including assessing trends in spectrum usage, meeting future demands, spectrum valuation, strategy and auction advice. For further information, please contact [Janette Stewart](#).