

2.2 MAJOR SPECTRUM ALLOCATIONS

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The Australian Communications and Media Authority (ACMA) is progressing a program of mid-band spectrum allocations to support a range of 5G technologies including mobile, fixed wireless and satellite services in the Australian market.

KEY ISSUES

- We are progressing 4 allocations of this mid-band spectrum, using a variety of licence types and allocation methods to support a range of different users and use cases:
 - an administrative allocation of area-wide apparatus licences (AWL) in remote areas of the 3.4–4.0 GHz band, intended to support both wide-area and local-area wireless broadband use cases. Applications for AWLs were invited in Q3 2023. Licensing decisions are expected to be made by early Q4 2023
 - an auction of spectrum licences in the 3.4 GHz and 3.7 GHz bands, intended to support deployment of wide-area wireless broadband services, such as mobile and fixed wireless networks. We consulted on draft allocation and technical instruments for the auction and made the allocation and technical instruments in Q3 2023. We expect to commence the auction in late October 2023
 - an administrative allocation of area-wide apparatus licences in the 3.8–3.95 GHz band, intended to support new local area wireless broadband deployments, and the continued deployment of satellite and point-to-point services. We consulted on licensing, allocation, technical and pricing arrangements in Q2 2023. We are considering responses to this consultation and plan to begin the allocation process in Q1 2024
 - an allocation of apparatus licences in urban excise areas of the 3.4–3.475 GHz band, and regional and metropolitan areas of the 3.95–4.0 GHz band, intended to support highly localised wireless broadband use. We plan to form a Technical Liaison Group to consider technical arrangements for the restricted cell spectrum. Contingent on learnings from the group, in Q1 2024, we plan to consult on the relevant technical and licensing arrangements.
- We estimated that the introduction of wireless broadband into the band would realise net benefits of \$560 million to the Australian economy.

Radio altimeters

- The aviation sector has been concerned about the potential for new mid-band 5G services to cause interference to radio altimeters in the 4.2–4.4 GHz band which are used for critical safety and non-critical aviation navigation purposes, such as in instrument landings.
- In consultation with the Civil Aviation Safety Authority (CASA), other industry stakeholders and in public consultation, the ACMA has implemented evidence-informed measures to manage the coexistence of radio altimeters in the 4.2–4.4 GHz band with other services in the 3.4–4.0 GHz band.
- The measures include obligations on both communications and aviation sectors, with ongoing and temporary mitigations applied to wireless broadband (WBB) deployments, and removal of the temporary mitigations after 31 March 2026.

- This package of measures is intended to provide certainty for both the communications and aviation sectors, while supporting new technology deployments. This will allow the timely roll out of 5G services while providing time for the aviation sector to improve radio altimeter performance.
- The interim mitigations will impose restrictions on wireless broadband deployments surrounding runways and approaches identified by CASA. After the end of the interim mitigation period, wireless broadband will be able to rollout consistent with ongoing arrangements that do not include these restrictions. It is anticipated that the interim measures will minimise disruption to aviation operations while giving air operators sufficient time to install any necessary equipment upgrades. CASA will be monitoring aviation sector progress in undertaking altimeter retrofits and achieving improved altimeter performance.

BACKGROUND

Coexistence of radio altimeters and wireless broadband services

- In making its planning decisions, the ACMA was aware of coexistence considerations between wireless broadband and radio altimeters on aircraft operating above 4200 MHz.
- The ACMA's 2021 planning decision included a 200 MHz guard band between wireless broadband and radio altimeters, and noted that coexistence would be considered further in the development of technical frameworks for wireless broadband use.
- A technical liaison group was re-formed in Q3-Q4 2022 to obtain further stakeholder feedback on proposed measures, followed by public consultation on draft measures and a comprehensive report on the issue in February-March 2023.
- Following the March 2023 consultation, the ACMA released the Radio Altimeter Outcomes paper in June 2023, which included the decided measures.
- There have been no confirmed issues in Australia from existing 5G/wireless broadband services that have been operating below 3.7 GHz for a number of years.
- The issue is being considered by other jurisdictions internationally. Similar planning for 5G in the United States has received a lot of public scrutiny. The Federal Aviation Authority (FAA) is currently managing a "retrofit" program to upgrade poor performing radio altimeters by 1 February 2024. The Airworthiness Directive (AD) that supports this upgrade in regulation also indicated that of 420 reports of radio altimeter anomalies, 75% were determined to not be related to 5G and none could be confirmed as being caused by 5G. They also estimated an estimated cost of US\$26 million to complete the rest of the remaining upgrades.

Key points from 3.4 and 3.7 GHz bands auction

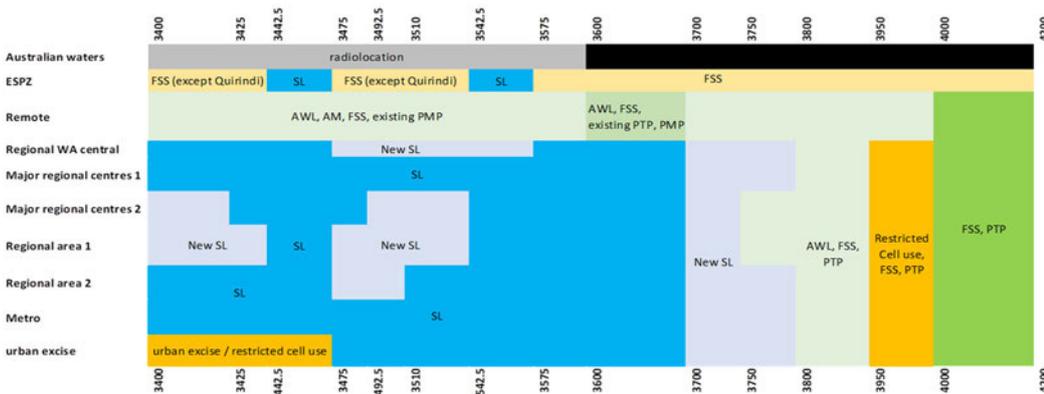
- The ACMA has considered feedback from submissions. A range of views were expressed about the auction timing, auction settings such as allocation limits and requests that ACMA lead a future defragmentation of mid-band spectrum.
- On 22 June 2023, we made the auction instruments and opened applications for the auction. In the allocation limits, we decided to not include 2.3 GHz band holdings on the basis that:
 - the misalignment between geographic areas in the 2.3 GHz and 3.4/3.7 GHz bands would significantly increase the complexity of the allocation limits and product design

- over the duration of the spectrum licences, other mid-band spectrum would become more substitutable from an equipment ecosystem perspective
- this approach is consistent with a number of similar spectrum auctions conducted in other jurisdictions.

Objectives for 3.4–4.0 GHz band allocations

- In undertaking this work, the ACMA is guided by:
 - the object of the *Radiocommunications Act 1992* (the Act), which is to promote the long-term public interest derived from the use of the spectrum by providing for the management of spectrum in a manner that:
 - facilitates the efficient planning, allocation and use of the spectrum
 - facilitates the use of the spectrum for both commercial purposes and non-commercial purposes including defence purposes, national security purposes and public safety and community purposes
 - supports the communications policy objectives of the Commonwealth Government.
 - a Ministerial Policy Statement made on 1 February 2022 by the former Minister for Communications, Urban Infrastructure, Cities and the Arts, the Hon Paul Fletcher MP, which specifies objectives intended to apply to the ACMA’s decisions regarding the 3.4–4.0 GHz band:
 - supporting the deployment of new and innovative technology including 5G
 - supporting a range of use cases and users
 - supporting digital connectivity and investment in regional Australia
 - promoting competitive markets.
- We are also mindful of relevant government communications policy statements, including the Statement of Expectations issued to the ACMA by the Minister for Communications, the Hon Michelle Rowland MP, in December 2022.

Planning decisions for the 3.4–4.0 GHz band



- Metropolitan and regional areas in the 3.4–3.8 GHz band will be spectrum licensed.
- Urban excise areas in the 3.4 GHz band and the 3.95–4.0 GHz band will be allocated as apparatus licences, for highly localised local area wireless broadband (LA WBB).
- The 3.8–3.950 GHz frequency range (3.750–3.950 GHz in some regional areas) will be allocated as area wide licences for macro-cell LA WBB, point to point and satellite.

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- New FSS applications in 3.8–4.0 GHz (3.75–4.0 GHz in some regional areas) will be via AWL receiver licences.
- The ACMA will retain the site-based fixed satellite service receiver licensing mechanism in remote areas in 3.4–4.0 GHz and in all areas in 4.0–4.2 GHz.
- Introducing AWLs in remote areas is expected to be net beneficial by at least \$51,000 each year over the next 10 years compared with the status quo, in addition to the overall net benefit of \$560 million derived from the new planning arrangements in the band.
- The table below summarises the amount of spectrum that will be available.

	Remote (Note 1)	Regional (Note 2)	Metro (Note 2)
Restricted Cell LA WBB	600 MHz	50 MHz	125 MHz
Macro LA WBB	600 MHz	150-200 MHz	150 MHz
WA WBB	600 MHz	350-400 MHz	400 MHz
Fixed Satellite Service	600 MHz	200-250 MHz	200 MHz
Point to Point	600 MHz	200-250 MHz	200 MHz

Note 1: Spectrum in remote areas is shared between all services on a coordinated basis.

Note 2: FSS and PTP services will share spectrum in regional and metro areas with macro LA WBB and restricted cell LA WBB use in the 3750/3800–4000 MHz band on a coordinated basis.

Other major allocations

- The ACMA is also preparing for an allocation of 2 GHz spectrum, with 2 x 25 MHz (1980–2005 MHz paired with 2170–2195 MHz) replanned for mobile-satellite services Australia-wide under apparatus licensing arrangements.
- The ACMA released 2 x 5 MHz (2005–2010 MHz paired with 2195–2200 MHz) dedicated for satellite internet-of-things and similar narrowband services for use on a shared basis, with apparatus licences recently issued in this segment.
- The ACMA will consult further on allocation method, and the technical frameworks for licences, with an allocation currently projected to occur in the 2024–25 financial year.

ATTACHMENTS

Attachment A ACMA's public messaging on radio altimeters

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ACMA'S PUBLIC MESSAGING ON RADIO ALTIMETERS

5G and aviation services in Australia | ACMA

5G AND AVIATION SERVICES IN AUSTRALIA

The ACMA has been planning for wireless broadband services in the 3.4–4.0 GHz band since 2019 and is now commencing allocation of licences in the band. We have worked with industry to establish relevant technical conditions to support a range of services in the band, including incumbent services.

The ACMA seeks to maximise the long-term public interest derived from using the radiofrequency spectrum through its efficient planning, allocation and use. This often requires balancing the needs and requirements of a range of different spectrum users.

In Australia, 4G and 5G wireless broadband (WBB) services have been operating in the 3.4 GHz and 3.6 GHz bands since 2016 and 2019, respectively, whereas aircraft radio altimeters operate above 4.2 GHz. There have been no recorded incidents in Australia of WBB systems interfering with radio altimeters.

There has been discussion in the United States and globally about the interaction between 5G and aviation services.

We have worked closely with the aviation and telecommunications sectors, and overseas regulators, to ensure that WBB services, including 5G, and aircraft radio altimeters can successfully co-exist in nearby frequency bands.

We have consulted on how new wireless services in the 3.4–4.0 GHz range could be introduced, including approaches for managing potential interference issues with radio altimeters. The planned arrangements already included a frequency separation of 200 MHz between WBB (such as 5G) and radio altimeter services.

The deployment of 5G and other innovative WBB services in the 3.4–4.0 GHz band (mid-band) is an important government priority that will bring benefits to Australian consumers and industry. Similarly, the government is committed to ensuring the safety of commercial air operations within Australia is not compromised, noting the importance of the reliable operation of radio altimeters to aviation safety.

Interim Mitigations

To ensure that an appropriate balance is struck between these 2 important public interests, the ACMA and Civil Aviation Safety Authority (CASA) have worked closely together to identify an acceptable precautionary approach to the deployment of 5G WBB services in the mid-band.

The ACMA is, therefore, putting place interim mitigations on new WBB deployments above 3.7 GHz until 31 March 2026, to manage the risk of 5G interference with aircraft radio altimeters. This will allow the timely roll out of 5G services while providing time for the aviation sector to improve radio altimeter performance.

The interim mitigations will impose restrictions on WBB deployments surrounding runways and approaches identified by CASA. After the end of the interim mitigation period, WBB will be able to rollout consistent with ongoing arrangements that do not include these restrictions. It is anticipated that the interim measures will minimise disruption to aviation operations while giving air operators sufficient time to install any necessary equipment upgrades.

Information on the decision-making and the detail of the mitigations is available in the wireless broadband and radio altimeter coexistence outcomes paper below.

Wireless broadband and radio altimeters coexistence_Outcomes paper

5G AND RADIO ALTIMETERS: KEY FACTS

About 5G

5G is the fifth generation of mobile network technology. It brings faster network speeds, lower latency, larger capacities and allows for more connected devices. It can potentially support self-driving cars, automated technologies and the internet of things.

5G operates at different bands:

- **low-band 5G** operates on frequency bands below 1 GHz. These networks support longer ranges and penetration into buildings, with the trade-off of slower speeds and capacity
- **mid-band 5G** operates on frequency bands between 1 and 6 GHz. These networks provide a balance between range, penetration into buildings and network speed
- **mmWave band (or high-band) 5G** operates on 26 GHz and above frequency bands. These networks support faster speeds and capacity at the cost of shorter range and less penetration.

5G in Australia

5G services have been operating in Australia since late 2018, with the first commercial launches at the start of 2019. The first band in Australia for 5G was 3.575–3.7 GHz, in the mid-band. Before the launch of 5G, 4G services were using this band since 2016.

In mid-2021, mmWave band 5G started to roll out in some cities, and in late 2021, spectrum licences were auctioned to support the deployment of low-band 5G.

We have now commenced the allocation of spectrum suitable for 5G in the wider 3.4–4.0 GHz frequency range.

About radio altimeters

Radio altimeters are instruments on aircraft used to determine their height above terrain. As a type of radar, they reflect radio waves from the ground to determine the height of the aircraft and are also important for some automated landing procedures.

Radio altimeters operate in the 4.2–4.4 GHz band globally.

Current status

5G is being rolled out in the mid-band around the world.

We are developing arrangements to support 5G services up to 4.0 GHz. The planning objectives are to enable a wide range of WBB use-cases, while protecting various incumbent services. Part of the planning work we undertake is to manage interference between many different spectrum uses. We have undertaken studies and have worked with industry to address any potential coexistence issues between radio altimeters in 4.2–4.4 GHz and 5G services nearby in the mid-band.

Every country has different environments, operating conditions, base station requirements and frequencies, which makes it difficult to directly compare measures between them.

In the United States, 5G has started in parts of the 3.7–3.98 GHz band. The US spectrum management agencies, telecommunications sector and aviation sector have developed mitigations to ensure coexistence until 1 February 2024, which the Federal Aviation Authority (FAA) have targeted to complete a radio altimeter retrofit program.

Other countries such as France, Canada and Japan, have rolled out 5G with different mitigations. France currently operates 5G between 3.4–3.8 GHz ,while Japan operates up to 4.1 GHz.

In Australia, mid-band 5G has been operating since 2019 up to 3.7 GHz, and there have not been any confirmed reports of radio altimeter interference to date. Before 5G services, 4G technologies were used in the band from 2016.

How the ACMA is managing the issue

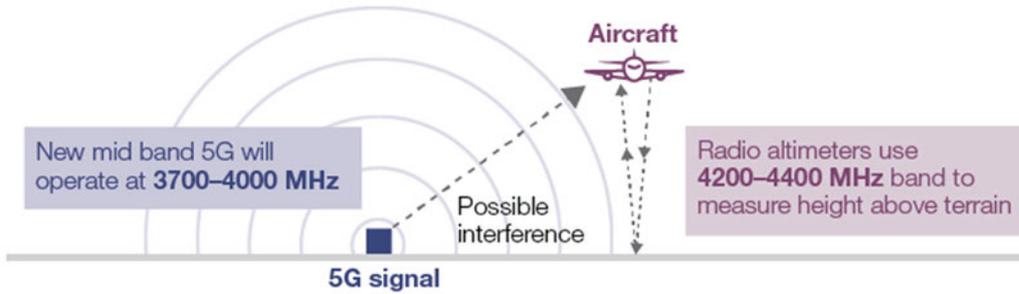
We collaborated with the telecommunications and aviation sectors in Australia to examine the issue further and determine how to achieve coexistence between 5G and radio altimeters.

We have worked with CASA to identify a precautionary approach to the deployment of WBB/5G services in the mid-band. There will be interim mitigations on new WBB deployments above 3.7 GHz until 31 March 2026, to protect against the risk of 5G interference with aircraft radio altimeters, which will allow the timely roll out of 5G services while providing time for the aviation sector to improve radio altimeter performance.

We have well-established practices to ensure that when new services are introduced into a spectrum band, the potential for interference with existing services is managed. These

processes include closely engaging with all potentially affected parties, conducting appropriate technical studies and monitoring developments internationally.

Potential for interference between 5G and radio altimeters



Separation between spectrum used for 5G and radio altimeters

