

Nokia response to ACMA's Apparatus Licences in the 3.4-4.0 GHz band in remote Australia

March 2022 consultation paper



About Nokia

We create the technology to connect the world. We develop and deliver the industry's only end-to-end portfolio of network equipment, software, services and licensing that is available globally. Our customers include communications service providers whose combined networks support 6.1 billion subscriptions, as well as enterprises in the private and public sector that use our network portfolio to increase productivity and enrich lives.

With an end-to-end portfolio that is unique in the industry, Nokia can work in partnership with operators to deliver "real 5G". Nokia's in house 5G mmWave Small Cells and AirScale BTS provide in-building and outdoor coverage, while our Microwave Anyhaul, Cloud native RAN, antennas, and 5G cloud-native core are part of approximately half of our agreements to date. Beyond our mobile networks portfolio, Nokia has excellent FP4 network processor-based IP routers and PSE-3 chipset powered optical networking - our customers can use the Nokia Network Services Platform to make this into full-5G-strength software defined connectivity 'smart network fabric' secured by Nokia Security Orchestration, Analytics and Response (Nokia SOAR) to ensure resilient 5G.

Nokia is a global leader in 5G standardization and technology innovation with a strategy specifically designed to support the Australian market. Nokia is proud to be a strong partner in the current roll-out of 5G in Australia, continuing our 120-year presence here.

Nokia has been selected by both Optus and TPG Telecom as a key supplier for the network deployments of 5G, including the required radio modules, as well as a major supplier to nbn for fixed network technology solutions. Nokia is also a supplier to various enterprises which have deployed private wireless networks deployed using apparatus licenses, including for example 27 mines with 10 customers in Australia. Globally Nokia has been selected by more than 150 operators to supply 5G networks.

Through our research teams, including the world-renowned Nokia Bell Labs, we are leading the world to adopt end-to-end 5G networks that are faster, more secure and capable of revolutionizing lives, economies and societies. Nokia adheres to the highest ethical business standards as we create technology with social purpose, quality and integrity.

For more information: <https://www.nokia.com/networks/5g/>

Disclaimer: This response is based on Nokia's current understanding of the market dynamics and various standards bodies; these dynamics are changing and hence our views may update with these changes

Nokia's position

Nokia welcomes the opportunity to respond to Australian Communications and Media Authority's consultation (ACMA) paper on the *Apparatus Licences (AWL) in the 3.4-4.0 GHz band in remote Australia*. As a leading player in the global communications sector, and contributor to the Australian market over many decades, Nokia is well placed to provide insight on market and technology trends, including industry structure and regulatory practice.

Nokia has contributed to ACMA's "Five-Year spectrum outlook (FYSO) 2021-2026" and will also respond to the latest FYSO. ACMA's FYSO sets a clear signal that all stakeholders should work together to meet the expected demand for spectrum for mobile broadband (public or private) and ensuring the speedy development of 5G.

Overall, Nokia welcomes ACMA's proposal to allocate remote areas of the 3.4-4.0 GHz bands in 2022 using apparatus licensing, with additional allocations to occur in 2023 in regional and metropolitan areas through a mixture of spectrum and apparatus licensing.

In relation to this specific consultation, Nokia welcomes the 600 MHz (3.4-4.0 GHz) spectrum in remote areas being allocated to AWLs. This will facilitate a wide range of use cases including WISP, public mobile telecommunications services, enterprise and campus style private networks, such as mine sites, agricultural uses or industrial uses. Wireless Broadband services and P2P are important technologies for some critical sectors of the Australian economy.

This is important as through discussions with various stakeholders, Nokia are seeing a strong demand from Enterprise customers wishing to deploy 5G private wireless solutions either standalone or through a carrier depending on their use case and buying preference. Spectrum is used by different sectors like mining and energy companies.

Nokia also welcomes the demonstrated urgency by the ACMA to commence allocation of AWLs in remote areas in June 2022, followed by AWLs in regional and metropolitan areas in 2023 (200 MHz in 3.8-4.0 GHz). Nokia see large economical value in the possibilities for enterprises to invest into private wireless networks using 3GPP technologies on their premises. Additional investment into private networks by private enterprises can significantly speed up the overall 5G take-up.

In fact, the Australian Mobile Telecommunications Association (AMTA) *5G Unleashed: Realising the Potential of the Next Generation of Mobile Technology report* highlights that while businesses recognise the importance of 5G for accelerating business growth (62%) while 30% of businesses are not planning to take up 5G-enabled technologies or don't know. In addition, 59% of businesses surveyed had no strategy for exploiting 5G. Australia cannot be a world leader in 5G unless this changes.¹

¹ https://amta.org.au/wp-content/uploads/2022/03/5G-Unleashed-Final-Report_combined-21-March-2022.pdf

Technical framework

Nokia supports the ACMA's proposed technical framework, including the revised AWL LCD, draft RALI MS 47, and updated RALI FX3 and FX19. However, Nokia would like to provide additional commentary on the topic of radio altimeters.

Compatibility with radio altimeters

Nokia strongly support "Approach A" proposed by the ACMA, which is to not introduce any additional mitigation measures beyond the 200 MHz guard band that exists between 4000-4200 MHz. It is worth noting that Nokia is working with trade associations (such as CTIA, 5G Americas) and the relevant authorities in the United States to address the reality of concerns.

In July 2021, 5G Americas issued a report related to Mid-Band Spectrum and the Co-Existence with Radio Altimeters² and CTIA sent additional inputs to the FCC on global deployment³. Finally, GSMA has released an official statement on January 2021⁴. From a technical point of view, Nokia is aligned with the latest CTIA statement:

Nearly 40 countries using this spectrum have already adopted rules and deployed hundreds of thousands of 5G base stations in the C-Band at similar frequencies and similar power levels—and in some instances, at closer proximity to aviation operations—than 5G will be in the US. None of these countries has reported any harmful interference with aviation equipment from these commercial deployments. For example, Norwegian regulator tested interference from 5G at 3700-3800 MHz to altimeters at Bergen airport. The outcome was that there was no interference identified in these measurements⁵.

Moreover, we have also noted in analysing aeronautical test results (such as AVSI) some basic issues. Altimeters, built to decades-old specifications and lacking any filtering in adjacent bands (or in this case, 220 MHz away), are driving the AVSI test results and interference analysis. Well-designed equipment with reasonable filtering should not be adversely affected by other equipment operating in adjacent bands — or hundreds of MHz away.

² <https://www.5gamericas.org/mid-band-spectrum-and-the-co-existence-with-radio-altimeters/>

³ <https://ecfsapi.fcc.gov/file/1103192305940/211103%20CTIA%20Ex%20Parte%20on%20C-Band%20International%20Deployments.pdf>

⁴ <https://www.gsma.com/newsroom/blog/close-collaboration-can-provide-a-clear-flight-path-for-5g-and-avionics/>

⁵ https://www.cept.org/Documents/ecc-pt1/65941/ecc-pt1-21-184_norway-results-of-the-preliminary-test-of-compatibility-between-mfcn-operating-in-3400-3800-mhz-and-radio-altimeters-operating-in-4200-4400-mhz

Therefore, no inferences were measured nor evident in countries where 5G is deployed in the C-band. Moreover, no meaningful study can be conducted as no up-to-date operational and technical parameters of radio altimeters are made available by the aviation community.

This is also aligned with the view of the Australian Mobile Telecommunications Association (AMTA) and in-line with the Australia Civil Aviation Safety Authority (CASA) who publicly stated in January 2022, that “*The Civil Aviation Safety Authority (CASA) has been closely monitoring the issue and so far we’ve seen no evidence 5G transmissions are currently affecting aircraft in this country.*”⁶

Finally, Nokia also support the ACMA’s clarification in the consultation paper that this issue will be studied further and therefore that any mitigations may be temporary or subject to future change.

Allocation Quantum Policy and Principles

Nokia supports ACMA’s allocation quantum policy to ensure deployment of new and innovative technology, a range of use-cases and users, and promoting competitive markets. It also supports the emergence of expanding use-cases as mentioned in the Ministerial Policy Statement for the 3.4–4.0 GHz band (MPS)⁷ which highlights that “*4G and 5G equipment availability in this band may provide opportunities for private enterprise applications, wireless internet service providers and other innovative operators.*”

It is worth further highlighting that that Nokia expect that the digitization of the industries will continue to grow and, as such, their demand for spectrum to increase over time across the different sectors. Their spectrum needs will depend on the use cases in terms of coverage, capacity and performances and will be addressed by a combination of local access and wide national coverage, via private networks and public ones. It is therefore important to consider an efficient mechanism to ensure the best usage of the scarce spectrum resources and encourage cooperation between CSPs and industries.

Therefore, Nokia supports the ACMA adoption of an ‘allocation window/allocation principles’ approach to manage scenarios where demand may exceed supply and apply a principles-based approach rather than first-in-time which would see the allocation outcome decided by the sequence of applications. In addition, the ACMA should also increase information to potential participants through on-line sessions or helpdesk for potential innovators to understand spectrum process and administrative requirements. This will also assist in considering applications as part of the staged allocation window approach to determine whether there are competing applications and sufficient spectrum to fulfil all applications

⁶ <https://www.casa.gov.au/no-sign-5g-interference-australia>

⁷ <https://www.legislation.gov.au/Details/F2022N00015>

Finally, Nokia supports the ACMA's allocation quantum policy limit of 100 MHz, with the ACMA having the discretion to allocate a larger quantum than this if provided sufficient evidence by the applicant as to why more than 100 MHz of spectrum is required.

Tenure and duration

Nokia acknowledges and supports the ACMA's proposal to limit the duration for the AWLs to align with expiration of spectrum licences in the 3.4 GHz band to facilitate potential replanning or defragmentation activity as well as still being open for applicants to seek a licence of a shorter duration.

With regards to spectrum for vertical industries, the 3GPP has analysed use cases and defined a set of functional requirements⁸ and system parameters related to communication services for each use case in each domain. Several of the developed service performance requirements⁹ have an impact on preferred spectrum management approach. High communication service availability can be reached through exclusive access to dedicated spectrum assignments and through protection from harmful interference.

Access to wide bandwidths is needed. The required service areas are typically geographically limited, covering one or several, local or regional areas, ranging from indoor coverage, up to few km². This means that frequency ranges below 4 GHz with sufficient transmit powers are preferred if outdoor coverage is required. Depending on the application, traffic may range from symmetric up to very asymmetric, in either direction requiring uplink/downlink ratio (UL/DL) flexibility from the technology, the deployment and the band regulation. Use of time division duplex (TDD) technology can provide the required duplex flexibility, though adjacent networks may need to be synchronized, which would limit the applicability.

The 5G Alliance for Connected Industries and Automation (5G-ACIA) addresses¹⁰ major challenges of 5G, highlighting spectrum and operator models. In order to meet extremely demanding latency and reliability requirements, licensed spectrum and protection from harmful interference are highly preferred.

Investment cycles of vertical industries differ from cycles of the telecom industry: cycles for media and entertainment are typically shorter, ranging between 2-3 years, for automotive industry 7-8 years, energy, manufacturing and mechanical industries 25 years, and for oil & gas from 10 to 25 years. Partly due to this difference, vertical industries may prefer to deploy their own networks. Furthermore, the timing for investing in wireless communications depends solely on their own

⁸ 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Study on Communication for Automation in Vertical Domains (Release 16), 3GPP TR 22.804, V16.1.0 (2018)

⁹ 3GPP: TS 22.261, v16.6.0 - Technical Specification Group Services and System Aspects; Service requirements for the 5G system; Stage 1 (Release 16). (2018).

¹⁰ 5G Alliance for Connected Industries and Automation (5G-ACIA): White Paper, 5G for Connected Industries and Automation, (2018).

business plans. Vertical industries require the assurance that for their networks there will be a continuity of service, without unjustified price increases, spectrum re-farming or technology upgrades over their planned life span.

While deploying and operating a wireless network for IIoT is not their core business, but an enabler for optimizing operations and productivity, enhancing security and safety, and improving planning and decision making. This means that the cost of spectrum should be affordable, suitable authorization process would be application based, and that the applications should be allowed to be submitted any time, based on the business need. It also means, that the license duration should be comparable to the investment cycle, and that overall regulatory certainty is needed for years to come.

In summary, the duration of licenses should be long enough to give industry the necessary timeframe to continuously invest in the latest and most spectrum-efficient infrastructure. Longer license durations, possibility of extensions or shorter durations offer investors more certainty for continuously investing in state-of-the-art technology. Transparent renewal conditions such as prior notice, timing and conditions of renewal are essential to allow operators and innovators to continuously invest in the networks.

Therefore, Nokia agrees with the ACMA that because there is a high number of users and mixed-use-cases anticipated in the band, AWLs in remote areas best satisfy the criteria for medium term (up to 10 years) licence duration, subject to shorter duration should there be a need.