

Nokia response to ACMA's Proposed updates to the LIPD Class Licence for 6 GHz RLANs



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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 views and recommendations on the 6 GHz spectrum

Nokia would like to thank ACMA for the opportunity to provide comments on the proposed updates to the LIPD Class licence for 6GHz RLANS. Nokia's answer to this consultation should be read in conjunction to the AMTA submission. Nokia as member of AMTA is supporting the findings and recommendations of the AMTA submission.

As digitalization of society and industries will continue to grow in relevance in the actual decade, the scarce radio spectrum resource plays an even more central role in supporting this trend. The demand for mobile broadband services will continue to grow requiring access to additional spectrum resources for wireless connectivity.

As mentioned in our previous submission, Nokia supports a balance approach in the 6 GHz frequency range between the licence- exempt and licensed use of the band. Allocating the range 5925-6425 MHz for license-exempt use and securing the 6425-7125 MHz for licensed use will allow satisfying all demands in the short and long term from both RLAN and IMT technologies.

While ACMA considers that it is not necessary to wait for WRC-23, Nokia strongly believe that the potential global harmonisation and the importance of this Conference should be strongly considered, and a cautious wait-and-see approach will be valuable for the Australian economy.

On the 5925-6425 MHz band, we are noting that ACMA is moving towards RLAN (low power, unlicensed use). However, Nokia wants to re-iterate the need to provide a level playing field framework to both 3GPP (5G NR-U) and IEEE (Wi-Fi) technologies.

The release of 500 MHz in the 5925-6425 MHz band for RLAN operations in Australia could provide extra-capacity to cover the needs of license-exempt technologies, by doubling the spectrum available for such operations. As such, up to roughly 1100 megahertz of license-exempt spectrum in the 2.4 GHz, 5 GHz and 5925-6425 MHz bands could be used for RLAN technologies (e.g., NR-U, Wi-Fi 6/6E and other), including with wide RLAN channels (of up to 160 MHz per channel) over both 5 GHz and lower 6 GHz bands.

Exclusive individually licensed and dedicated spectrum continues to be the preferred approach to unlocking spectrum for use with 3GPP technology because of the predictability and quality of service that comes with it and the certainty it brings when investing in the (public) mobile networks. However, where clearing the spectrum from incumbent users is not possible in the short term (if clearing is very expensive and lengthy process, or spectrum

cannot be vacated by existing users), co-existence and sharing of the spectrum resources should be considered, at least as a first step.

With regard to AMTA's submission, Nokia echoes the demand for both licensed and unlicensed use in the 6 GHz band and we strongly recommend that the ACMA gives due consideration to an allocation for IMT in the upper sub-band 6425-7125 MHz, for an overall balanced approach in this spectrum range.

Indeed, Nokia is agreeing that additional mid-band spectrum for IMT is required in the timeframe 2025-2030 as recent studies demonstrate it. The recent report from Coleago Consulting Ltd *"IMT spectrum demand: Estimating the mid-band spectrum needs in the 2025-2030 time frame in Australia"* concludes that the most densely-populated Australian cities - Sydney, Melbourne and Brisbane - require between 387 and 827 MHz of *additional* mid-band spectrum, compared to the 703 MHz currently assigned to operators. This study complements the GSMA's July 2021 report *"Estimating the mid-band spectrum needs in the 2025-2030 time frame, Global outlook"*, which concluded that between 1020 and 3690 MHz of mid-band spectrum is required in a range of 36 cities around the world, in order to deliver target performance of 100 Mbps downlink and 50 Mbps uplink and accommodate 1 million connections per square kilometer.

The industry is clearly urging the need for government policy supporting the allocation of additional spectrum for IMT over this decade: at least 300 MHz of mid-band spectrum by 2025 and 500 MHz by 2030.

The deployment of 4G/5G is also rebalancing and changing the use of Wi-Fi by the consumers. South Korea, one of the early regional 5G adopters, records a consistent decrease of the Wi-Fi offload to the MNO's Wi-Fi networks (see table¹) despite of the significant growth in wireless mobile traffic.

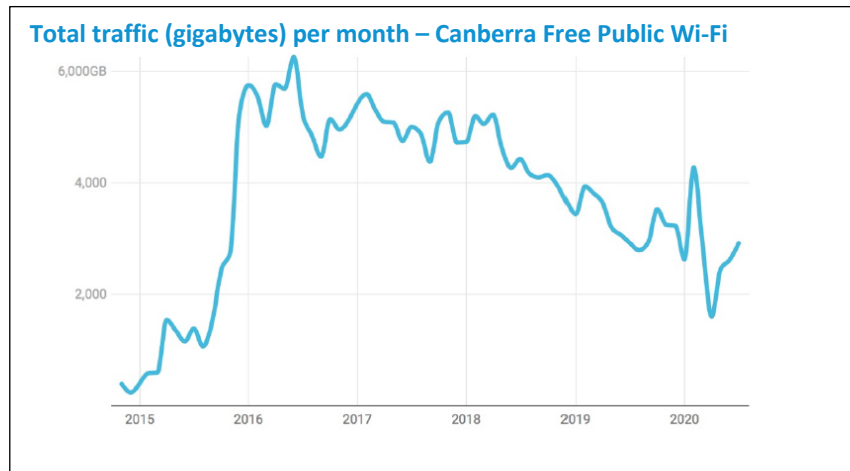
Period	Delivery by IMT services (TB)	IMT as a proportion of total data traffic	Delivery by Wi-Fi (TB)	Wi-Fi as a proportion of total data traffic	Total wireless data (TB)
Dec-15	175,103	92.6%	10,430	5.6%	185,533
Dec-16	254,639	94.2%	12,952	4.8%	267,591
Dec-17	315,152	95.3%	14,495	4.4%	329,647
Dec-18	404,656	96.4%	15,099	3.6%	419,755
Jun-19	479,414	96.9%	15,552	3.1%	494,966
Dec-19	568,375	97.4%	15,110	2.6%	583,485
Jun-20	603,612	97.9%	13,025	2.1%	616,637
Dec-20	701,529	98.5%	10,408	1.5%	711,937
Jun-21	780,662	98.4%	13,051	1.6%	793,713
Jul-21	786,729	98.6%	11,306	1.4%	798,035

Source: Korean Ministry of Science and Technology (MSIT), August 2021.⁵⁰ Excludes Wi-Bro traffic 2015 to 2018. IMT services includes 2G, 3G, 4G and 5G as applicable

¹ www.msit.go.kr/SYNAP/skin/doc.html?fn=55f72758d63d2cd4a31b794f513bc265&rs=/SYNAP/sn3hcv/result/

According to Tefficient², in May 2021 a majority of the mobile data traffic in South Korea, some 52.4 percent of the mobile data traffic was handled over 5G. This is notwithstanding that 5G represented only 22.2 percent of the total SIM base, indicating that the average mobile data usage per 5G subscriber in South Korea is far higher than for 3G/4G subscribers. In May 2021, 5G users used an average of 27.4 GB per month while 4G users used an average of only 9.4 GB per month.

It is also important to note that with the fast take up of 4G and 5G with significantly improved performance, as well as with the broad availability of unlimited data plans for consumers, the usage of public Wi-Fi networks has fallen considerably in



recent years. One example in Australia is the public Wi-Fi in Canberra. Canberra has the largest free Wi-Fi network³ of any Australian city. According to the ABC, Australia's national broadcaster, six years after the network was set up, far fewer people are actually using it — raising questions about its value (see table). Further, the number of Canberrans using the service had almost halved before the coronavirus outbreaks, as the cost of mobile internet fell.⁴

In developed country markets there is also considerable demand for 5G FWA. For example, in Australia, there has been an immediate and notable impact of access to 5G spectrum in the market for home broadband services. MNOs are able to offer 5G home broadband services on their mobile network, albeit in a limited number of areas currently, which offer comparable speeds, data allowances and price to fixed line services. 5G technology enables MNOs to have a stronger presence by offering services comparable to those offered on the NBN network. The three major Australian MNOs – Telstra, Singtel Optus, and TPG Telecom – have all launched 5G FWA products.

² Tefficient, *Industry analysis #2*, 2021, 31 July 2021, page 14

³ www.cmtedd.act.gov.au/digital/cbrfree-public-wifi

⁴ www.abc.net.au/news/2020-08-13/canberra-expands-free-wifi-but-fewer-people-are-usingit/12551266

From a spectrum management perspective, Asia-Pacific regulators should acknowledge the growing use of FWA and include such services in their spectrum roadmaps and demand analysis. According to Tefficient, in July 2021 for example, in Europe, the wholesale data-only base in Austria and Finland averaged over 75 GB per month, while French FWA services were averaging over 165 GB per month. Asia-Pacific may see higher usage for FWA services per month, depending on retail pricing.

It must also be recognized that 5G to work best needs additional IMT spectrum to be assigned to licensees in larger contiguous blocks. Larger spectrum allocations – if done at reasonable prices – allow mobile operators to deploy wireless networks which can be shared for both mobile and FWA applications. This provides some sort of a ‘silver bullet’ for the problem of encouraging competitive pressures in the broadband markets. Given the challenges described earlier in securing mid-band spectrum in the region, the strong regional growth of FWA emphasizes the need for a significant proportion of the 6 GHz band to be allocated to IMT purposes to support the growth in this market segment.

In bands where incumbents are present and need to be protected, in terms of geography and equipment power, solutions including those relying on databases can improve coordination between services, minimizing the required separation and risk for interference, reducing restriction zones, and optimizing thus the use of the spectrum. Recent approaches such as LSA/eLSA in Europe, CBRS and AFC (Automated Frequency Coordination) in the USA have the merit of optimizing the access such bands. For example, the AFC that the FCC is implementing in the USA in the 6 GHz band, can provide the benefit to use the band with higher (standard) power by the unlicensed users.

Nokia is one of the early proponents of LSA/eLSA in Europe and is highly involved in the US in the development of standards and technical specification of spectrum sharing solutions in CBRS and AFC and would be happy to provide additional insights based on our expertise if such solutions are to be evaluated in the European context. Lessons learned from CBRS standardization include:

- Creation of Multi-stakeholder group(s) is key: all interested parties, including the incumbents, discussing in a single forum allows for a more efficient standardization process. One important goal is to understand incumbencies upfront.
- Develop protection criteria for incumbents based on actual impact instead of theoretical impact of potential interference to the incumbents.

- Use realistic propagation model and assumptions to assess potential interference on incumbents.
- Identify key use cases to ensure all the needed requirements are addressed in baseline requirements.
- The higher the number of tiers and the diversity of use cases targeted for the band, the higher the complexity, e.g., for defining the coexistence framework, i.e., the framework to maximize spectral efficiency and minimize interference.
- Consider flexibility in specifications development to develop the ecosystem, enable trials as early as possible, etc.
- Any shared band will require a balance between flexibility of specifications which introduces more testing and certification requirements and future proofing
- Mistakes can be costly: After networks are commercially operating and/or testing and certification is completed for required network elements, it is complex to approve changes which can lead to inefficient operation.
- Introduce requirements and options for sharing protocol extensibility.
- Consider features for transition between Releases (baseline mandated) and other optional releases.
- State diagram to allow for flexibility and optimizations in operation.
- Open-ended features without clear associated requirements may get misused
- Explore testing and certification models which allow for agile / continuous testing of Spectrum/Frequency controllers (e.g., CBRS SAS, 6GHz AFC) functionality.
- Third party certification body vs. Government certification with the goal for quick and thorough testing.

Regarding the Automated Frequency Coordination while this is important to explore different tools to manage the spectrum, it is important to note that it is a lengthy process and a “learning curve” such as CBRS. The United States is also specific with more than 90.000 FS in the 6GHz scattered on the whole US territory.

AFC standardization – in which Nokia is also highly involved – is ongoing in the WInnForum in the USA and has still to be tested/calibrated. We therefore suggest monitoring and starting discussion on the tool, but Nokia is recommending a more traditional approach in the case of Australia.