NOKIA CONTRIBUTION

To the Re-planning of the 3700–4200 MHz band   
Options paper

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**September 13th, 2020**

# 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](https://www.nokia.com/networks/portfolio/small-cells/) and [AirScale BTS](https://www.nokia.com/networks/solutions/airscale-radio-access/" \t "_blank) provide in-building and outdoor coverage, while our [Microwave Anyhaul](https://www.nokia.com/networks/portfolio/microwave-anyhaul/), [Cloud native RAN](https://www.nokia.com/networks/solutions/airscale-cloud-ran/), antennas, and [5G cloud-native core](https://www.nokia.com/networks/solutions/airgile-cloud-native-core-network/) are part of approximately half of our agreements to date. Beyond our mobile networks portfolio, Nokia has excellent [FP4 network processor-based IP routers](https://www.nokia.com/networks/technologies/fp4/) and [PSE- 3 chipset powered optical networking](https://www.nokia.com/networks/technologies/photonic-service-engine/) - our customers can use the [Nokia Network Services Platform](https://www.nokia.com/networks/products/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 has been selected by both Optus and VHA as a key supplier for the network deployments of 5G, including the required radio modules. Nokia is also a supplier to various enterprises which have deployed private wireless networks deployed using apparatus licenses. Globally Nokia has been selected by more than 65 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 View

Global 5G harmonization is happening now, and the 3.3-3.8 GHz spectrum range is at the epicentre of this, being the spectrum for near-term deployment of robust 5G services. Spectrum harmonisation helps to achieve economies of scale, enables global roaming and reduces equipment design complexity. 3GPP has developed two bands supporting the 3.5GHz ecosystem: band n78 covering 3.3-3.8GHz and band n77 covering 3.3-4.2GHz.

As of end August 2020 GSA’s NTS database showed:

* C-band spectrum has been a key early focus of investment by operators. 178 operators were investing in C-band spectrum (3300-4200 MHz), with 82 of those known to be actively deploying networks using 3GPP Band n77 or Band n78.
* C-band spectrum was already well supported in devices at that point. By August GSA had catalogued 178 announced 5G devices positioned as supporting Band n78 or Band n77. The majority (117) of those were phones, followed by non-industrial CPE at 27 devices, with modules making up the next largest category at 23 announced devices.

In the different previous consultation, Nokia has recommended to ACMA to adopt a consistent spectrum emission management framework across the entire 3.4-3.8GHz band, including modernisation of existing arrangements for 3.4GHz Spectrum License Band and 3.5GHz Band, aligned on 3GPP outputs. Nokia welcome the latest decision of ACMA to align with the 3GPP approach.

While representing a shift from current arrangements, this approach aligns the entire band and benefit existing and new licensees by enabling the uninhibited deployment of 5G services and the use of mMIMO technology without performance compromise. This approach puts Australia under a framework consistent with other regions of the world and aligned with the outputs of 3GPP, positioning Australia to leverage the global 5G ecosystem to the greatest possible degree.

The 3300-4200 MHz band offers the unique opportunity for largest amount of spectrum below 6 GHz. The amount of contiguous spectrum that can be made available in the 3300-4200 MHz range offers an interesting opportunity for the exploitation of the innovative capabilities of the latest IMT technologies, with particular reference to the 5G New Radio air interface which will deliver increased capacity and connectivity.

In last year consultation, Nokia has also recommended to ACMA to further investigate the potential future use of 3800-4200 MHz for private wireless networks. In line with our position on 3700 MHz-3800 MHz, the proposed scenario C opens this opportunity. 5G New Radio (NR) Band n77 has been defined for 3.3-4.2 GHz covering the proposed range of 3.8-4.2 GHz. With demand also from other regions such as USA and Japan, Nokia expect a quickly evolving ecosystem for Band n77.

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.

Production and automation industry have gathered with Communication Service Providers (CSPs) and the vendor community in 5G-ACIA to express requirements for industrial use of 3GPP technologies. Networks need to be tailored to industry needs in terms of performance, availability and reliability, privacy and security, and meeting their operational requirements. Specifically, stringent performance requirements in terms of guaranteed bandwidth and low latency at very high availability levels e.g. in wireless production control make access to licensed spectrum necessary. Thus, Nokia support individually licensed spectrum on a per location base for local private enterprise use. Access to licensed spectrum for private enterprises shall not preclude any usage scenarios in terms of how such private networks are implemented.

Therefore, we encourage ACMA to further assess and promote identification of spectrum for Private Wireless networks. This approach will benefit of a combined evolution of the band ecosystem between the extended use of it for CSPs in some areas in the Asia Pacific region and North America and the shared use with localised licensing system for private networks approach in Europe. As such, ACMA can attain the goal for efficient management of the spectrum resources while opening a harmonised frequency band n77 with a robust 5G ecosystem to the industries.

Finally, Nokia supports the availability of largest contiguous frequency range within the 3300-4200 MHz. At national level, many countries will need to plan and carry out actions in order to address current fragmentation of existing assignments.

**Nokia recommends a modified “Option 3” proposed by GSA**

Taking into consideration the ACMA’s desirable outcomes: to introduce new WBB uses, both wide area and local area, with suitable technical frameworks; support continued uses in the band; and to ensure coexistence with adjacent band services, in particular radio altimeters operating above 4200 MHz and services below 3700 MHz[[1]](#footnote-1) the GSA concurs with ACMA’s evaluation that Option 3 is preferred. By further considering the points made in the sections above Nokia recommends additional small adjustments to the Option 3 proposal to maximize the benefits to Australian businesses and consumers and ensure the desirable outcomes are enabled to the greatest extent.

The adjustments recommended by Nokia and GSA shown in the figure below, are:

* Extending the amount of contiguous spectrum available for spectrum licensing in the major metropolitan centres by 200 MHz
* Exclusive spectrum licensing in regional areas in the range 3700-3800 MHz
* Apparatus licensing for LA WBB in regional areas in the range 3800-4000 MHz; and
* Apparatus licensing LA WBB in remote areas in the range 3700-4000 MHz
* Apparatus licensing for indoor LA WBB Australia wide in the range 4000-4200 MHz

Figure 1: GSA recommended modified "option 3"

**Metro and Regional**

Planned uses: WA WBB

Access approach: Exclusive use

Licence Type: Spectrum license

Incumbent user licenses: cleared

**Remote**

Planned uses: FSS, PTP, LA WBB

Access approach: Shared, coordinated, first-in-time

Licence Type: Apparatus license

Incumbent user licenses: continued

**Metro Centres**

Planned uses: WA WBB

Access approach: Exclusive use

Licence Type: Spectrum license

Incumbent user licenses: cleared

**Regional**

Planned uses: FSS, PTP, LA WBB

Access approach: Shared, coordinated, first-in-time

Licence Type: Apparatus license

Incumbent user licenses: continued

**Australia Wide**

Planned uses: individually licensed FSS, PTP, LA WBB (indoor)

Access approach: Shared, coordinated, first-in-time

Licence Type: Apparatus license

Incumbent user licenses: continued

3700 MHz

3800 MHz

4000 MHz

4200 MHz

Importantly, the proposal indoor restriction for apparatus licensing of WBB in the 4000 – 4200 MHz is intended as an initial step to allow WBB in this band segment whilst protecting incumbent co-channel services (FSS and PTP) and adjacent channel radio altimeter use. The GSA is aware that the co-existence of 5G and radio altimeters in adjacent spectrum is currently the topic of study in the ITU-R and GSA members are participating in these studies. Once the co-existence studies have been completed the provisions for WBB in the 4000 – 4200 MHz may be reviewed. It may be possible to create exclusion zones around sensitive areas, such as airports, that will allow radio altimeters to operate without interference and WBB to be used in outdoor scenarios.

1. [↑](#footnote-ref-1)