Future use of the upper 6 GHz band: Options paper

Submission | ACMA

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Introduction

1. Thank you for the opportunity to provide feedback on planning options to possibly introduce radio local area networks (RLANs) and/or wide-area wireless broadband (WBB) services into the upper 6 GHz band (**the draft**).

2. Spark is a New Zealand mobile network provider and actively participates in international spectrum standards bodies. Aligning band planning and allocations across major international and regional markets is important for promoting the efficient use of spectrum and a regional technology eco-system, particularly for small open economies that rely on scale achieved in major overseas markets.

3. At the WRC 23, Asia Pacific's large economies were strongly in favour of opening the whole band 6425- 7125 GHz for IMT. These countries included China, Japan and India. The three large Asian economies provide a very strong motivation for regional harmonisation and economies of scale that will turn benefit Australia and New Zealand.

4. In our view, the upper 6G band (6425 - 7125 MHz) should be made available for IMT use as the foundation for wide area deployment of 5G Advanced and 6G. While WRC 2027 is considering additional bands for 6G, given the large number of incumbents in the alternative bands being considered, the upper 6 GHz band remains an important option for supporting 5G Advanced and 6G technologies.

5. The upper 6 GHz band is highly contested and a candidate band for IMT deployment in New Zealand. Accordingly, while we acknowledge that spectrum policy and planning is for relevant national authorities, we wanted to highlight the latest international developments relating to the upper 6GHz band.

6. In this submission we provide a further update on recent trials that suggest the band is suitable for wide area urban coverage, and comments on recommended carrier bandwidths and geographic segmentation (should ACMA consider a shared approach).

International developments relating to upper 6 GHz band

7. As set out in our feedback on ACMA's draft Five-year spectrum outlook 2024–29, international developments make the band ideal for providing significant capacity and supporting wide area network use cases:

    a. The upper part of the 6Ghz band has been widely adopted for IMT use. WRC 23 agreed to make the 6425-7125 MHz (n104) range available for IMT use in Region 1. Further, several Region 3 countries have joined country footnotes that permits the use of this band for IMT in these countries and technical conditions is captured in RESOLUTION COM4/7 (WRC-23) ensure protection for FSS (Earth-to-space) services.

    b. This is a 3GPP standardised band for mobile use. As 5G radio carriers can only be deployed with other radio carriers, the standardisation of band combinations with 5G bands such as n105 is important. This standardisation is currently underway in 3GPP, the first combination undergoing standardisation being n78 and n104 bands. We also note that other CA band combinations involving n104 and bands that are in use in Australia and NZ will follow. Spark also intends to pursue CA combinations of band n104 with 600 MHz band n105.

    c. We expect to see strong continued growth in demand for mobile data. Ericsson reports that global mobile network data traffic is expected to reach 160 EB per month at the end of 2023, and 563 EB per month by the end of 2029. Further, new

extended reality services were standardised in 3GPP Rel. 19 that require significant bandwidth. For example, entry level Virtual Reality services would require > 50 Mbps per user with a conservative 300:1 compression.

8. As planning within international standards bodies for 6G advances it is becoming clear that there is little available spectrum to support these technologies' very high-bandwidth requirements. While some countries may have the option of relying on spectrum bands in the 10GHz-30GHz range, the economics of wide area deployments in those ranges in Australia and New Zealand are challenged.

9. It is our view the upper 6G band should be made available for IMT use as the foundation for wide area deployment of 5G Advanced and 6G.

Upper 6 GHz band localised capacity or wide area coverage?

10. The upper 6 GHz band is considered a capacity band with coverage on a par with the C band. Therefore, the band is suitable for providing significant wide area capacity that complements the coverage benefits of sub 1 GHz band deployments.

11. There are several field trials reported in the literature that have demonstrated that there are no technical barriers to use of upper 6 GHz band for wide area coverage. Several trials are underway, and more trials are expected over time:

    a. **UAE operators du and e&** have recently completed a successful 5G-Advanced trial project involving the 6 GHz band. Using 400 MHz bandwidth, the trial achieved a throughput of 10 Gbps. The UAE regulatory body TDRA noted that the increase in data speed will support many future projects, that require highly sophisticated technologies (e.g. nanotech) and high internet speeds, such as remote diagnostics in healthcare, or autonomous (self-driving) vehicle projects in transportation, as well as help in the management of some industrial installations.

    b. **German operator Deutsche Telekom** did a 6 GHz trial that achieved a peak data rate of ~12 Gbps. This was achieved via aggregation of two 5G data streams - from 6 GHz and 3.7 GHz spectrum (C band). The results highlight the capacity expansion benefits of 5G deployment using carrier aggregation of 3.5 GHz and 6 GHz mid-band spectrum and on par coverage of both bands.

    c. **Vodafone Spain** announced a successful test of the upper 6 GHz band and achieved download speeds of up to 5 Gbps and on average 2 Gbps across various indoor locations.

    d. **Ericsson and MediaTek** carried out an interoperability test involving 5G NR data calls over 6 GHz band. This was performed with a MediaTek prototype test device and an Ericsson base station. The test was the first 5G NR data call on the 3GPP-defined n104 band (6.425-7.125 GHz) and demonstrates the efforts by telecom vendors, and device/chipset makers to build a global ecosystem for IMT in the 6 GHz band.

12. We are not seeing any impediments to IMT deployments in this band.

Carrier Bandwidths and Spectrum parcels?

13. Amongst the new use cases to be supported by the upper 6 GHz band are VR/XR. These are large bandwidth consuming services and can be supported in turn via larger carrier bandwidths-preferably the maximum carrier bandwidth (100 MHz); for example, the per user rates vary from 53Mbps (entry level VR) to 353 Mbps (advanced level VR).

14. Going forward the upper 6Ghz band will also support IMT 2030. Here also larger carrier bandwidths (100-200 MHz) are preferred. The upper 6 GHz band (n104) has a maximum carrier bandwidth of 100 MHz. Therefore, the most efficient use of the band is where bandwidths of 100MHz is available for deployments.

15. If ACMA did decide to divide the band into different RLAN and WA WBB segments, then we recommend it recognise the importance large bandwidths for 5G use cases such as VR/XR and efficient carrier bandwidths.

Spectrum sharing with RLANs on a geographic basis?

16. Both n104 and RLANs are TDD systems. In a TDD system, spectrum is shared between DL and UL via nominated time slots. Base stations within an operator's network have the same TDD patters to avoid inter base station interference. Usually, the base stations of adjacent operators are also aligned with the same TDD pattern for inter operator co-existence.

17. The sharing of RLANs and IMT systems will be like two TDD systems where the TDD pattern is not synchronised. A study of sub band full duplex (**SBFD**) has recently been done by 3GPP where the feasibility of SBFD is discussed and the deployment complexities. IMT base stations for SBFD co-existence will need to be SBFD capable. Likewise, for the UEs.

18. The level of complexity for RLAN and IMT sharing in the same area will be much more significant than SBFD and is not advisable.

[end]