



TELSTRA CORPORATION LIMITED

Draft spectrum reallocation recommendation for the 26 GHz band in cities and regional centres consultation paper

Public submission

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EXECUTIVE SUMMARY

We welcome the opportunity to respond to the ACMA's consultation on the *draft spectrum reallocation recommendation for the 26 GHz band (draft recommendation)*. The 26 GHz band is important for enabling the next phase of very high speed fifth generation (5G) mobile services for Australian consumers and businesses and is underpinning the delivery of millimetre wave (mmWave) 5G wireless broadband services globally. We commend the ACMA for prioritising the 26 GHz band and strongly encourage the ACMA to make the reallocation recommendation as quickly as possible.

We support the ACMA's position on the key elements of the draft recommendation

We support the ACMA's position on the key elements in Table 2 of the consultation paper covering licence type, parts of the spectrum (frequency range 25.1-27.5 GHz), reallocation periods and reallocation deadline. In addition, we support the ACMA's position on other matters associated with the draft recommendation, including:

- a licence term of 15 years (being the maximum term permitted under the Act);
- the ESMRA allocation methodology;
- a lot configuration of 24 x 100 MHz lots; and
- the proposal for 34 defined areas, comprising of cities and regional centres (with minor modifications).

We believe further work is required to assess the various options for the geographic lot configuration, and recommend this matter be considered further as part of the consultation process for the allocation instruments.

We recommend aligning the geographical boundaries with other 5G bands

While we support the defined-area approach proposed by the ACMA, we recommend the ACMA align the geographic boundaries as closely as possible with other 5G band geographic areas (i.e. those for 3.4 GHz and 3.6 GHz) to simplify network deployment in 5G areas. We also recommend that the 34 defined areas be further rationalised down to 32 areas by creating contiguous blocks of geographically adjacent areas (where demand can be forecasted in the corridors that would otherwise exist between the areas) to minimise boundary interference coordination issues and avoid the creation of unhelpful coverage gaps along these corridors.

The decision on 24.7-25.1 GHz should wait...

While agreeing with the ACMA's draft reallocation recommendation that the frequency range 25.1-27.5 GHz be spectrum licensed, we maintain our view that the lower edge of the band could be as low as 24.7 GHz. Rather than close off this option now, we propose the ACMA defer consideration of this band segment until the EESS coexistence issues are resolved at WRC-19. Depending on the WRC outcome, it may be possible for ACMA to relax emission limits at the lower end of the 26 GHz band so the 25.1-27.5 GHz segment can be considered for spectrum licensing. The reallocation of this segment could be completed in a separate process after the 25.1-27.5 GHz process.

The 26 GHz auction should happen by mid-2020

We believe the 26 GHz band should remain the ACMA's highest priority. Timely access to this band is critical to enable the next phase of very high speed and low latency 5G services to be launched in Australia. This consultation is a welcome step towards achieving that outcome, but it is critical that urgency continues to be applied to the remaining steps and conducting an auction as early as possible in the second half of 2020.

01 Introduction

We welcome the opportunity to make this submission in response to the ACMA's consultation on the *draft spectrum reallocation recommendation for the 26 GHz band*.

The consultation requests responses on the four key elements of the draft recommendation, as well as responses to other matters associated with the draft recommendation, and we have framed our response accordingly.

Our submission is structured as follows:

- Section 2 – **26 GHz band should remain the ACMA's highest priority**, restates our position that the 26 GHz band should remain the highest priority on the ACMA's work program;
- Section 3 – **Elements of the draft recommendation and other matters**, sets out our response to the key elements and the other matters associated with the draft recommendation; and
- Section 4 – **The decision on 24.7-25.1 GHz band should wait until after WRC-19**, provides an explanation as to why the ACMA should wait until after WRC-19 to make a final decision on this portion of the band.

02 26 GHz band should remain the ACMA's highest priority

In previous submissions^{1,2,3} we have stated the case for the 26 GHz band to be given the ACMA's highest priority for re-allocation work. This band is one of the first of the mmWave bands to be widely allocated internationally for wireless broadband services. We maintain that this band should remain ACMA's highest priority, due to its importance in enabling the next phase of very high speed and low latency 5G services to be launched in Australia.

Spectrum is a critical ingredient for delivering mobile services. We commend the ACMA on the successful allocation of the 3.6 GHz band and the ACMA's continued focus on releasing spectrum to enable the timely deployment of 5G services in Australia. It is important that the focus on the 5G mmWave bands is maintained and the spectrum in this band is released as soon as possible. Commercial 5G network equipment and devices for the 26 GHz band (as opposed to the 28 GHz band) are expected to become available later in 2019 or early 2020 and we are pleased to see the sense of urgency being applied to accelerating access to this spectrum.

We remain committed to providing our customers with the latest and best communications tools and services so that Australian consumers can benefit from these developments, and businesses can be

¹ Telstra submission to ACMA consultation on "Wireless broadband in the 26 GHz band", 9 November, 2018, <https://www.acma.gov.au/-/media/Spectrum-Transformation-and-Government/Issue-for-comment/IFC-32-2018/Telstra-submission-pdf.pdf>

² Telstra submission to "FYSO 2019-2022", 20 May, 2019, Exec Summary Pg 3.

³ Telstra submission to "FYSO 2018-2022", 6 July, 2018, Pg. 3.
<http://www.acma.gov.au/~media/Spectrum%20Licensing%20Policy/Issue%20for%20comment/IFC%2023%202016/Telstra%20submission.pdf>



increasingly competitive and productive on both the domestic and international stages. Delivering the next phase of 5G and other new technologies is important for delivering this commitment.

03 Elements of the draft recommendation and other matters

Table 2 on page 9 of the consultation outlines the ACMA's proposed position on key elements of the draft recommendation, including licence type, parts of the spectrum, reallocation periods and reallocation deadline. In addition, the consultation paper raises other matters relevant to a price-based allocation for comment including licence term, allocation methodology, geographic areas, as well as frequency and geographic lot configuration.

Table 1 below provides a summary of the ACMA's proposals for each key elements of the reallocation design, along with our position for each of these.

Element / matter	ACMA's Proposal	Telstra's Position
Licence type	Spectrum licences	Support
Parts of the spectrum	25.1-27.5 GHz in 34 specified cities and regional centres	Support (with minor changes to defined areas)
Reallocation periods	Two-and-a-half years	Support
Reallocation deadline	12 months before the end of the reallocation period	Support
Licence term	15 years (licences issued to commence as soon as possible after allocation)	Support
Allocation methodology	Two-stage Enhanced simultaneous multi-round ascending (ESMRA) format	Support
Geographic areas	34 cities and regional centres (defined areas). These areas consist of population centres greater than 50,000 and smaller centres which are either holiday centres or contain university campuses which have seasonal population increases.	Support with some changes
Frequency lot configuration	24 lots of 100 MHz consisting of two lot categories in Perth, Hobart, Bunbury and Margaret River to safeguard the existing NBN gateway uplinks, which would mean a split with a lower band consisting of 19 lots (25.1–27.0 GHz) and upper band consisting of 5 lots (27.0–27.5 GHz).	Support
Geographic lot configuration	Each of the 34 defined areas should be offered for allocation as separate products.	Please see below.

Table 1: Elements of the draft recommendation
(Blue shaded cells are a reproduction of Table 2 from the consultation).

As can be seen, we support most of the key elements. In relation to geographic areas, frequency lot configuration and geographic lot configuration we explain our thinking in more detail in the sections below.

Geographic areas

While we support the principles behind the 34 defined areas⁴, we believe they can be further rationalised to 32 defined areas. There are three drivers for our suggested changes:

1. Contiguous coverage makes sense where areas are geographically adjacent, and it can be reasonably forecast that urbanisation and/or population growth in the corridor between adjacent defined areas over the duration of the licence tenure will drive this requirement. Also, it is not sensible to leave narrow 'slivers' of geography between spectrum licenced areas, as these may turn out to be unusable by apparatus licences and simply create coverage gaps. Examples of where this situation applies are:
 - Fraser Coast region which effectively joins the Bundaberg and Hervey Bay areas;
 - Bathurst along the Great Western Highway corridor;
 - Bunbury along the Forrest Highway corridor; and
 - Ballarat and Bendigo toward greater Melbourne.
2. Having larger spectrum licence areas creates an effective buffer zone to avoid unnecessary breaches of the device boundary conditions. This is going to be especially important with 5G TDD systems where the risk of base station to base station interference across a spectrum licence geographic boundary can be significant.
3. Alignment of the proposed 26 GHz licence areas, where possible, with those for other 5G bands (i.e. 3.4 and 3.6 GHz bands) spectrum licence areas makes sense from a network architecture perspective, as it creates flexibility to deploy 5G technology in the most appropriate bands for each geographic area.

We suggest that no spectrum licensed area should be smaller than 3x3 HCIS Level 1 blocks, and in general, no cross-section through the body of a spectrum licensed area should be narrower than 3 HCIS Level 1 blocks to avoid breaches of device boundary conditions.

Please refer to attachment A for our suggested changes to the defined areas. The relevant KML files will also be emailed separately to the ACMA.

Frequency lot configuration

Currently, 400 MHz is the largest channel size included in 5G standards in this band⁵ and, as acknowledged in the consultation paper, "lot structure of 6 x 400 MHz would go some way to mitigating frequency based exposure risk as bidders are less likely to obtain uneconomical amounts of spectrum"⁶. For this reason, a 400 MHz lot size would be preferable. However, we acknowledge that the most appropriate frequency lot configuration is to have 24 x 100 MHz lots (Frequency option 1 in the

⁴ consisting of population centres greater than 50,000 and smaller centres which are either holiday centres or contain university campuses which have seasonal population increases.

⁵ 400 MHz is the largest channel size in the current version of 3GPP TS 38.104, available on the [3GPP website](https://www.3gpp.org/ftp/Specs/3GPP%20TS/38/104/38104-1.zip).

⁶ Consultation paper, page 27



consultation paper) as it provides for more flexibility while also allowing the possible creation of two lot categories in Perth, Hobart, Bunbury and Margaret River to safeguard the existing NBN gateway uplinks.

Geographic lot configuration

We understand that the ACMA's preliminary view is that each of the 34 defined areas should be offered for allocation as separate products (i.e. Option 2 for the geographic lot configuration) 7. While this provides maximum flexibility (e.g. a prospective licensee could purchase spectrum for just single town) it would complicate the auction due to the large number of lots, and potentially create 'exposure risks' if a bidder is seeking spectrum in a specific subset of locations.

We believe further work is required to properly assess the pros and cons of the various options, and recommend this matter be considered further as part of the future consultation process on the allocation instruments.

04 The decision on 24.7-25.1 GHz band should wait until after WRC-19

While agreeing with the ACMA's draft reallocation recommendation that the frequency range 25.1-27.5 GHz should be spectrum licensed, we maintain our view that the lower edge of the band could be as low as 24.7 GHz⁸. A total of 2.4 GHz (25.1-27.5 GHz) is proposed in the draft recommendation to the Minister, which seems like a considerable quantity of spectrum on offer, but we note that demand may be well in excess of this quantity if each mobile network operator is seeking around 1 GHz of spectrum to realise the full potential of 5G mmWave technology⁹. We also note that 500 MHz (i.e. 27.0-27.5 GHz) is constrained by a licence condition to protect satellite services. Making the additional 400 MHz segment between 24.7-25.1 GHz available for wide-area wireless broadband (WWB) would assist to address these issues.

We also observe a well-documented, positive correlation between the provision of mobile services and economic/social benefit. The *Mobile Nation 2019 – The 5G Future*¹⁰ report by Deloitte Access Economics found that the mobile industry continues to make a significant contribution to Australia's economy. Deloitte Access Economics estimates that the mobile industry contributed \$22.9 billion of value added to GDP in 2017-18. While the relationship between the quantum of spectrum and an increase in economic benefit is not infinitely linear, even a fraction of a percent increase in GDP amounts to many millions of dollars, providing further justification for preserving an option for a WWB allocation in the 24.7-25.1 GHz segment.

WRC-19 Agenda Item 1.13 is considering bands for future IMT use, including the 24.25-27.5 GHz band. This necessarily includes investigating co-existence with Earth Exploration Satellite Service (EESS) at the lower edge of the 26 GHz band, and we observe that the final emission limit restrictions to be

⁷ Consultation paper, page 30

⁸ Telstra submission to ACMA consultation on "Wireless broadband in the 26 GHz band", 9 November, 2018, page 7 <https://www.acma.gov.au/-/media/Spectrum-Transformation-and-Government/Issue-for-comment/IFC-32-2018/Telstra-submission-pdf.pdf>

⁹ GSMA 5G Spectrum Policy Position. 6 Nov 2018. <https://www.gsma.com/spectrum/5g-spectrum-policy-position/>

¹⁰ Deloitte Access Economics, *Mobile Nation 2019- The 5G Future*, commissioned by AMTA 2019.



imposed on operators in the 26 GHz band to protect the EESS are yet to be determined. We are optimistic that WRC-19 will make decisions to facilitate a lower boundary of 24.7 GHz for IMT services.

We also observe that in the United States, the FCC recently concluded¹¹ an auction of 700 MHz¹² of spectrum between 24.25-24.45 GHz and 24.75-25.25 GHz for fixed and mobile operations. Whether or not we approve of the FCC 'jumping the gun' ahead of WRC-19 deliberations, this will set a precedent for the level of adjacent channel emissions in the EESS 23.6-24.0 GHz band. Vendors will now inevitably develop mobile network equipment and devices with adjacent channel emission specifications to suit the US market and this will have implications for equipment supplied to the global market.

For these reasons we are asking the ACMA to reserve its decision on the 24.7-25.1 GHz segment until after the outcome of WRC-19 is known. This includes deferring the plan to introduce Australia-wide indoor and outdoor class licensing in the 34 cities and regional centres, along with Australia-wide apparatus licensing for areas outside the 34 defined areas. We propose that the ACMA undertake another consultation after WRC-19 to make a final decision on the future allocation of this segment, followed by a separate auction of the spectrum (if it is decided that the segment should be spectrum licensed).

¹¹ <https://www.cnet.com/news/fcc-raises-2-billion-in-second-5g-spectrum-auction/>

¹² <https://www.fcc.gov/auction/102/factsheet>

05 Attachment A

Suggested changes to defined geographical areas. We suggest combining Ballarat with Bendigo and Harvey Bay with Bundaberg. Please note, the relevant KML files will also be emailed separately to the ACMA.

Item	Area name	Suggested HCIS areas
1	Adelaide	As per ACMA Consultation paper
2	Albany	As per ACMA Consultation paper
3	Albury-Wodonga	LW5P, LW6M, LW8D, LW8H, LW9A, LW9E, LW5O2, LW5O3, LW5O5, LW5O6, LW5O8, LW5O9, LW8C2, LW8C3, LW8C5, LW8C6, LW8C8, LW8C9, LW8G2, LW8G3, LW8G5, LW8G6, LW8G8, LW8G9
4	Armidale	NU7G7,NU7G8,NU7G9, NU7K1,NU7K2,NU7K3, NU7K4,NU7K5,NU7K6
5	Ballarat	KW9I, KW9J, KW9M, KW9N, KX2G, KX2H, KX2K, KX2L, KX3A, KX3B, KW8H6, KW8H9, KW8L3, KW8L6, KW8L9, KW8P3, KW8P6, KW8P9, KW9E4, KW9E5, KW9E6, KW9E7, KW9E8, KW9E9, KW9F4, KW9F5, KW9F6, KW9F7, KW9F8, KW9F9, KW9G4, KW9G5, KW9G7, KW9G8, KW9K1, KW9K2, KW9K4, KW9K5, KW9K7, KW9K8, KW9O1, KW9O2, KW9O4, KW9O5, KW9O7, KW9O8, KX2C7, KX2C8, KX2C9, KX2D3, KX2D6, KX2D7, KX2D8, KX2D9, KX2O1, KX2O2, KX2O3, KX2O4, KX2O5, KX2O6, KX2P1, KX2P2, KX2P3, KX2P4, KX2P5, KX2P6, KX3C1, KX3C2, KX3C4, KX3C5, KX3C7, KX3C8, KX3E1, KX3E2, KX3E3, KX3E4, KX3E5, KX3E6, KX3E7, KX3E8, KX3F1, KX3F2, KX3F3, KX3F4, KX3I1, KX3I2, KX3I4, KX3I5, KX3I7, KX3M1, KX3M4, KX3M5, KX3M2, KX3M3, KX3I8, KX3I9, KX3I6, KX3I3, KX3E9, KX3F5, KX3F6, KX3G4, KX3G5, KX3G6, KX3G1, KX3G2
6	Bathurst	MV8G,MV8F3,MV8F6,MV8F9,MV8J3,MV8K1,MV8K2,MV8K3,MV8H4,MV8H5,MV8H6,MV8H7,MV8H8,MV8H9,MV8L1,MV8L2,MV8L3
7	Bendigo	KW9I, KW9J, KW9M, KW9N, KX2G, KX2H, KX2K, KX2L, KX3A, KX3B, KW8H6, KW8H9, KW8L3, KW8L6, KW8L9, KW8P3, KW8P6, KW8P9, KW9E4, KW9E5, KW9E6, KW9E7, KW9E8, KW9E9, KW9F4, KW9F5, KW9F6, KW9F7, KW9F8, KW9F9, KW9G4, KW9G5, KW9G7, KW9G8, KW9K1, KW9K2, KW9K4, KW9K5, KW9K7, KW9K8, KW9O1, KW9O2, KW9O4, KW9O5, KW9O7, KW9O8, KX2C7, KX2C8, KX2C9, KX2D3, KX2D6, KX2D7, KX2D8, KX2D9, KX2O1, KX2O2, KX2O3, KX2O4, KX2O5, KX2O6, KX2P1, KX2P2, KX2P3, KX2P4, KX2P5, KX2P6, KX3C1, KX3C2, KX3C4, KX3C5, KX3C7, KX3C8, KX3E1, KX3E2, KX3E3, KX3E4, KX3E5, KX3E6, KX3E7, KX3E8, KX3F1, KX3F2, KX3F3, KX3F4, KX3I1, KX3I2, KX3I4, KX3I5, KX3I7, KX3M1, KX3M4, KX3M5, KX3M2, KX3M3, KX3I8, KX3I9, KX3I6, KX3I3, KX3E9, KX3F5, KX3F6, KX3G4, KX3G5, KX3G6, KX3G1, KX3G2
8	Brisbane	As per ACMA Consultation paper
9	Bunbury	BV7G,BV7C4,BV7C5,BV7C6,BV7C7,BV7C8,BV7C9,BV7D4,BV7D5,BV7D7,BV7D8 ,BV7H1,BV7H2,BV7H4,BV7H5,BV7H7,BV7H8,BV7K1,BV7K2,BV7K3,BV7L1,BV7L2 ,BV4O4,BV4O5,BV4O6,BV4O7,BV4O8,BV4O9,BV7C1,BV7C2,BV7C3,BV7D1,BV7D2,BV4P4,BV4P5,BV4P7,BV4P8
10	Bundaberg	NS8N,NT2B,NT2C,NT2G,NT2H,NT2K1,NT2K2,NT2K3,NT2K4,NT2K5,NT2K6,NT2L1,NT2L2,NT2L3,NT2L4,NT2L5,NT2L6,NS8M2,NS8M3,NS8M5,NS8M6,NS8M8,NS8M9,NT2A2,NT2A3,NT2D7,NT2D8,NT2D9



Item	Area name	Suggested HCIS areas
11	Cairns	LQ1K, LQ1L, LQ1O, LQ1P, LQ1J2, LQ1J3, LQ1J5, LQ1J6, LQ1J8, LQ1J9, LQ1N2, LQ1N3, LQ1N5, LQ1N6, LQ1N8, LQ1N9, LQ4B2, LQ4B3, LQ4B5, LQ4B6, LQ4C1, LQ4C2, LQ4C3, LQ4C4, LQ4C5, LQ4C6, LQ4D1, LQ4D2, LQ4D3, LQ4D4, LQ4D5, LQ4D6
12	Canberra	As per ACMA Consultation paper
13	Coffs Harbour	As per ACMA Consultation paper
14	Darwin	As per ACMA Consultation paper
15	Hervey Bay	NS8N, NT2B, NT2C, NT2G, NT2H, NT2K1, NT2K2, NT2K3, NT2K4, NT2K5, NT2K6, NT2L1, NT2L2, NT2L3, NT2L4, NT2L5, NT2L6, NS8M2, NS8M3, NS8M5, NS8M6, NS8M8, NS8M9, NT2A2, NT2A3, NT2D7, NT2D8, NT2D9
16	Hobart	LY8L, LY8P, LY9I, LY9J, LY9K, LY9L, LY9M, LY9N, LY9O, LY9P, LZ2D, LZ2H, LZ3A, LZ3B, LZ3C, LZ3D, LZ3E, LZ3F, LZ3G, LZ3H, LY8H4, LY8H5, LY8H6, LY8H7, LY8H8, LY8H9, LY9E4, LY9E5, LY9E6, LY9E7, LY9E8, LY9E9, LY9F4, LY9F5, LY9F6, LY9F7, LY9F8, LY9F9, LY9G4, LY9G5, LY9G6, LY9G7, LY9G8, LY9G9, LY9H4, LY9H5, LY9H6, LY9H7, LY9H8, LY9H9, LZ2L1, LZ2L2, LZ2L3, LZ3I1, LZ3I2, LZ3I3, LZ3J1, LZ3J2, LZ3J3, LZ3K1, LZ3K2, LZ3K3, LZ3L1, LZ3L2, LZ3L3
17	Launceston	LY5C, LY5D, LY5G, LY5H, LY6A, LY6B, LY6E, LY6F, LY5K1, LY5K2, LY5K3, LY5K4, LY5K5, LY5K6, LY5L1, LY5L2, LY5L3, LY5L4, LY5L5, LY5L6, LY6I1, LY6I2, LY6I3, LY6I4, LY6I5, LY6I6, LY6J1, LY6J2, LY6J3, LY6J4, LY6J5, LY6J6
18	Lismore	NU3M3, NU3N1, NU3N2, NU3M6, NU3N4, NU3N5, NU3M9, NU3N7, NU3N8, NU3I6, NU3J4, NU3J5, NU3I9, NU3J7, NU3J8
19	Mackay	As per ACMA Consultation paper
20	Margaret River	As per ACMA Consultation paper
21	Melbourne	As per ACMA Consultation paper
22	Mildura	As per ACMA Consultation paper
23	Perth	As per ACMA Consultation paper
24	Port Macquarie	As per ACMA Consultation paper
25	Rockhampton	MS6A, MS6B, MS6C, MS6D, MS6E, MS6F, MS6G, MS6H, MS6I, MS6J, MS6K, MS6L
26	Shepparton-Mooroopna	As per ACMA Consultation paper
27	Sunshine Coast	As per ACMA Consultation paper
28	Sydney	As per ACMA Consultation paper
29	Traralgon-Morwell	As per ACMA Consultation paper



Item	Area name	Suggested HCIS areas
30	Toowoomba	As per ACMA Consultation paper
31	Townsville	LR2C, LR2D, LR2G, LR2H, LQ8N8, LQ8N9, LQ8O7, LQ8O8, LQ8O9, LQ8P7, LQ8P8, LQ8P9, LR2B2, LR2B3, LR2B5, LR2B6, LR2B8, LR2B9, LR2F2, LR2F3, LR2F5, LR2F6, LR2F8, LR2F9, LR2J2, LR2J3, LR2J5, LR2J6, LR2K1, LR2K2, LR2K3, LR2K4, LR2K5, LR2K6, LR2L1, LR2L2, LR2L3, LR2L4, LR2L5, LR2L6, LR3A1, LR3A2, LR3A4, LR3A5, LR3A7, LR3A8, LR3E1, LR3E2, LR3E4, LR3E5, LR3E7, LR3E8, LR3I1, LR3I2, LR3I4, LR3I5
32	Tuncurry-Forster	As per ACMA Consultation paper
33	Wagga Wagga	As per ACMA Consultation paper
34	Warrnambool	As per ACMA Consultation paper