



nbn's submission on draft allocation instruments for the 26 GHz (25.1–27.5 GHz) metropolitan and regional lots auction and technical framework

21 August 2020



Thank you for the opportunity to comment on the 'Draft allocation instruments for the 26 GHz (25.1–27.5 GHz) metropolitan and regional lots auction, Consultation paper, July 2020' and '26 GHz (25.1–27.5 GHz) band spectrum licence technical framework, Consultation paper, July 2020'. We set out our response below and would be happy to provide further information.

Draft technical framework

nbn supports ACMA's proposed approach to managing the interference environment. In particular, the application of the mask concept and bandwidth scaling to the entire frequency range, all geographies, and all transmitters (base stations and user equipment). This provides some predictability for satellite service providers.

TRP bandwidth reference

nbn proposes that the spectrum licence core conditions relating to scaling factor would be more effective if it was linked to an alternative bandwidth reference for the TRPs. We suggest scaling all power levels to **50 MHz** bandwidth. This alternative reference aligns with the minimum channel size for the spectrum licenses and relatively well with the smallest carrier size available for FR2 5G configurations. In practical terms, this alternative reference of 50 MHz would therefore effectively capture the highest anticipated power spectral densities.

To emphasise the point that proportionately higher TRPs are permitted for channels wider than 50 MHz, Note 2 could be modified to indicate that for operation in channels wider than 50 MHz the TRP can be scaled logarithmically.

nbn's proposed amendments to the spectrum licence conditions and notes are marked up below.

Unwanted emission limits outside the geographic areas

15. Core Conditions 16 and 17 apply in relation to those areas that are outside the geographic areas set out in Part 2 of Licence Schedule 1.

16. The licensee must ensure that the maximum permitted level of radio emission for an area outside the areas set out in Part 2 of Licence Schedule 1 caused by the operation of radiocommunications devices under this licence does not exceed a total radiated power of:

- (a) ~~39 45~~ dBm/~~50 200~~ MHz for radiocommunications transmitters operating in the frequency range 25.1 GHz–27 GHz; or
- (b) ~~36 42~~ dBm/~~50 200~~ MHz for radiocommunications transmitters operating in the frequency range 27 GHz–27.5 GHz and located outside a gateway footprint area; or
- (c) ~~24 30~~ dBm/~~50 200~~ MHz for radiocommunications transmitters operating in the frequency range 27 GHz–27.5 GHz and located inside a gateway footprint area.

Note 1: For radiocommunications devices which employ an antenna array, the total radiated power limit applies to the aggregate power of all antenna elements in the antenna array.

Note 2: ~~Logarithmic scaling should be used to find the appropriate level in alternative bandwidth. To calculate the TRP limits in alternative bandwidths greater than 50 MHz the TRP limits above can be increased using logarithmic scaling.~~

17. The licensee complies with Core Condition 16 by ensuring that the maximum permitted level of radio emissions caused by the operation of radiocommunications transmitters under this licence does not, in any place, exceed a total radiated power of:

- (a) ~~39 45~~ dBm/~~50 200~~ MHz for radiocommunications transmitters operating in the frequency range 25.1-27 GHz; or

- (b) ~~36 42~~ dBm/~~50 200~~ for radiocommunications transmitters operating in the frequency range 27-27.5 GHz and located outside a gateway footprint area; or
- (c) ~~24 30~~ dBm/~~50 200~~ for radiocommunications transmitters operating in the frequency range 27-27.5 GHz and located inside a gateway footprint area.

Note 1 For radiocommunications devices which employ an antenna array, the total radiated power limit applies to the aggregate power of all antenna elements in the antenna array.

Note 2 ~~Logarithmic scaling should be used to find the appropriate level in alternative bandwidth.~~ To calculate the TRP limits in alternative bandwidths greater than 50 MHz the TRP limits above can be increased using logarithmic scaling.

Technical conditions within 27.0-27.5 GHz outside defined gateway footprint areas

In **nbn's** view, the conditions proposed to apply *outside* the gateway footprint areas appear to lack the same balance as those proposed to apply *inside* these areas.

- *Outside* the gateway footprint areas, defined by a nominal satellite beam -3 dB relative gain contour, an additional 12 dB of interfering power would be permitted and no pointing restrictions would apply.
- In geographies close to, but *outside*, the gateway footprint areas, this would create a minimum 9 dB interference deficit, in addition to the unknown interference component resulting from no pointing or emission mask restrictions.

We advise that the conditions proposed to apply *outside* the gateway footprint areas may inadvertently result in interference into satellite services to be dominated by terrestrial emissions outside the main beams of **nbn's** satellites. This could counteract the results of the carefully designed conditions proposed to apply *inside* the gateway footprint areas.

Noting ACMA's prudent approach to TRP increases in 27.0-27.5 GHz *within* gateway footprint areas, which ensure no additional interference to the baseline case, one approach that could avoid the risk identified under the current proposed conditions would be to extend the gateway footprint areas beyond the 3 dB contour. Extending to a -12 dB relative gain contour would not extend the geographic area significantly yet still provide adequate protections.

Alternatively, **nbn** suggests a similar approach as that proposed by ACMA to apply *within* gateway footprint areas in regards to TRP increases to apply *outside* these areas. We propose amended conditions to apply *outside* gateway footprint areas as follows:

- A new baseline of 30 dBm (per 200 MHz), increased by 5 dB to account for the mitigation provided by the satellite beam off-axis suppression. The same baseline pointing restrictions applying inside the gateway footprint areas would also apply outside.
- An additional allowance of TRP up to 37 dBm (per 200 MHz), on the condition of no additional interference compared with the baseline. This could be achieved by taking the EIRP mask applying inside the gateway footprint areas, and relaxing it by 5 dB.
- No invocation of No. 4.4, which would be inadvisable in a band used by a number of domestic and international high throughput satellite services, including the critical national infrastructure operated by **nbn**.

The proposed amendments are summarised in the Table below and would ensure a more balanced interference environment in which emissions *outside* gateway footprint areas would be no more interfering than those *inside*.



Frequency/area	TRP limit	Additional conditions ¹
25.1–27 GHz all areas	34 40 dBm/50 200 MHz (baseline)	No extra conditions
	39 45 dBm/50 200 MHz (upper limit)	Antenna pointing restrictions* and EIRP mask
27–27.5 GHz outside gateway footprint areas	24 37 dBm/50 200 MHz (baseline)	Extra antenna restrictions developed in the TLG** No extra conditions
	31 42 dBm/50 200 MHz (upper limit)	Antenna pointing restrictions* and EIRP mask
27–27.5 GHz inside gateway footprint areas	19 25 dBm/50 200 MHz (baseline)	Extra antenna restrictions developed in the TLG**
	24 30 dBm/50 200 MHz (upper limit)	Antenna pointing restrictions* and EIRP mask

* The main antenna beam is not to be mechanically or electrically steered above the horizon. This restriction applies to all outdoor transmitters.

** Outdoor base stations must not be mechanically steered above the horizon and must not direct the main beam (via electrical steering) to elevation angles greater than 5° above the horizon for more than 5% of time within a 24-hour period. Outdoor fixed transmitters, which are not base stations, must not direct their main beam to within defined angles from the geostationary orbit.

¹ In addition to adhering to *resolves* 2.1 and 2.2 of ITU-R Resolution 242 (WRC-19).

	Radiated maximum true mean power (dBm/200 MHz EIRP)		
Elevation angle above the horizontal plane (el)	For transmitters in 25.1–27 GHz	For transmitters in 27–27.5 GHz and outside footprints	For transmitters in 27–27.5 GHz and inside footprints
5 degrees \leq el < 15 degrees	$= 62 - 1.3(el - 5)$	-	-
15 degrees \leq el < 25 degrees	49	39 46	34
25 degrees \leq el < 55 degrees	$= 49 - 0.43(el - 25)$	$= 39 46 - 0.43(el - 25)$	$= 34 - 0.43(el - 25)$
55 degrees \leq el \leq 90 degrees	36.1	26.1 33	21.1

It is suggested that the values in the Table above defining mask limits be normalised to 50 MHz, i.e. all limits subtracted by 6 dB. This is to align with the scaling concept explained above.

Draft allocation instruments

nbn supports the proposed use of the ESMRA auction methodology and provides views on the draft allocation instruments as follows:

- **Licence commencement.** **nbn** supports the start date of a spectrum licence being tied to receipt of payment for that licence.
- **Lot configuration – frequency.** **nbn** supports the lot size for each geographic area in the 26 GHz band auction being 200 MHz resulting in 12x200 MHz lots for each product. This is assuming that this configuration would not affect the enforceability of conditions proposed to safeguard **nbn**'s gateways in the 27.0-27.5 GHz frequency range.
- **Lot configuration – geography.** **nbn** supports the proposed Greater Perth Product configuration and offering the remaining areas as separate products.
- **Allocation format.** **nbn** supports reducing the period between the nomination of demand and the start of the auction to a period of approximately 3 weeks.
- **Activity rule.** **nbn** supports the use of a global activity rule.
- **Application process.** **nbn** supports setting the eligibility payment as a uniform percentage of the starting price for each of the nominated lots.
- **Starting prices.** **nbn** supports providing ACMA with the power to change the starting prices before the auction.
- **Affiliated applicants.** We suggest that the ACMA prescribe the form in which applicants provide associates data, including that the data is provided in an electronically searchable format, to assist with identifying affiliated applicants. We also suggest that the ACMA ensure sufficient time is provided for auction participants to review associate data provided by other registered bidders both initially and in the event of any changes.
- **Payment terms.** **nbn** supports providing a delayed payment option.