

Changes to the 3.9 GHz licence out-of-block emission limits

Technical update

Report

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1. Overview

- 1.1 As part of our May 2024 consultation, [Optimal use of 3.9 GHz spectrum](#), we consulted on technical changes to H3G's 3.9 GHz licence to enable its use of 5G technology. This included changes to the out-of-block (OOB) emission limits and the assumed levels that we proposed to use in coordination going forward. We proposed to define the out-of-block emissions in the same way as in H3G's 3.6 GHz licence. Ofcom received responses to the consultation that expressed concern about this change, which stakeholders highlighted is a 49dB increase in the OOB emissions, and the effect it would have on incumbent users. This concern is also relevant to the additional option to change the permitted frequency blocks in H3G's 3.9 GHz licence from 3925-4009 MHz to 3800-3884 MHz.
- 1.2 We are therefore providing further analysis which shows that the impact on incumbent Shared Access users would be minimal as any interference in practice would be dominated by the shared access receiver performance. There would be no risk to Fixed Links or Satellite Earth Stations as we proposed to take account of the new emission limits in our coordination process.

2. Analysis

Changes to OOB emissions as part of the proposed licence variation

- 2.1 As part of our May 2024 consultation, we proposed to:
- Define the out-of-block emission limits for non-AAS base stations in the same way as they are defined in the 3.6 GHz licence.
 - Add power limit conditions for AAS base stations, which are expressed in TRP, based on the non-AAS EIRP value minus 21dBi assumed antenna gain. This is the same approach as in the 3.6 GHz licence.¹
- 2.2 Table 1 shows the out-of-block emission limits proposed in our May 2024 consultation.

Table 1: Out-of-block emission limits for proposed varied 3.9 GHz licence

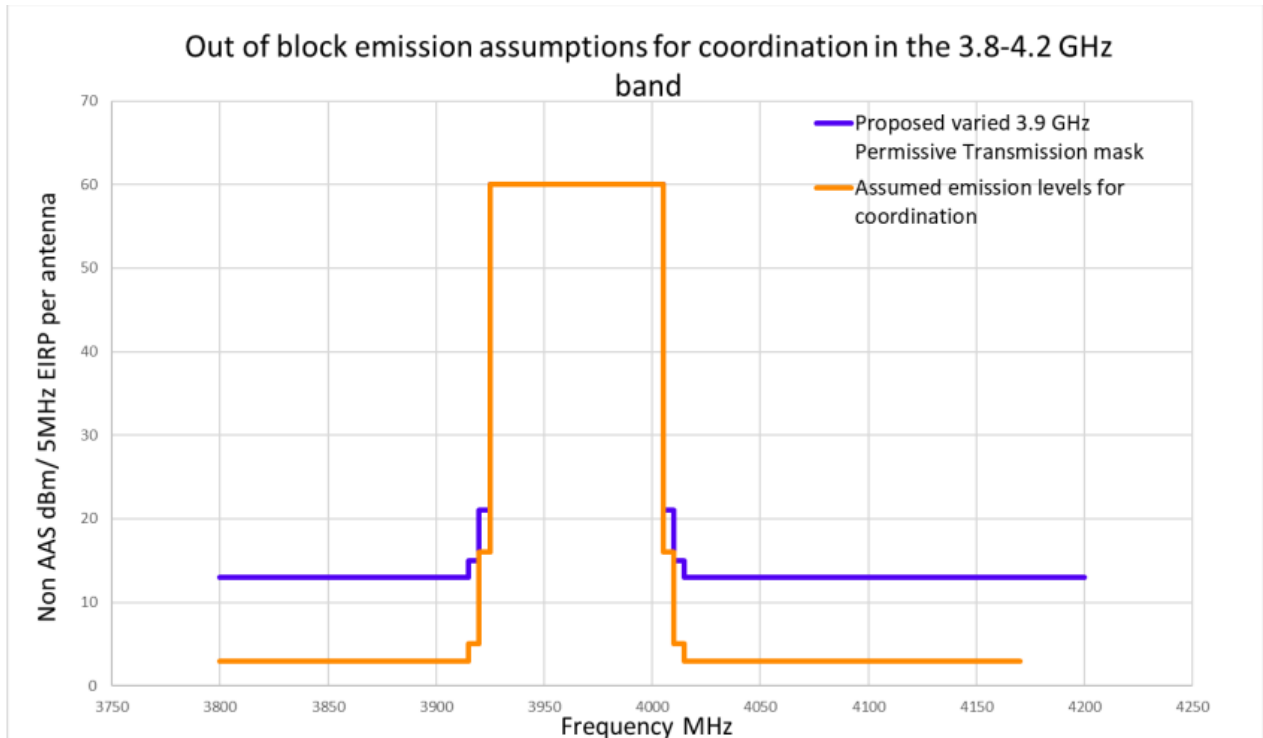
	Non AAS dBm / 5MHz EIRP per antenna	AAS dBm / 5 MHz TRP per cell
Permissive Mask		
-5 to 0 MHz offset from lower block edge 0 to 5 MHz offset from upper block edge	Min(PMax – 40, 21)	Min(PMax’ – 40, 16)
-10 to -5 MHz offset from lower block edge 5 to 10 MHz offset from upper block edge	Min(PMax – 43, 15)	Min(PMax’ – 43, 12)
Out-of-block baseline power limit (BS) < -10 MHz offset from lower block edge > 10 MHz offset from upper block edge	Min(PMax – 43, 13)	Min(PMax’ – 43, 1)
Restrictive Mask		
Out-of-block baseline power limit (BS)	-34	-43

- 2.3 We recognised, and as noted in ECC Report 249, that out-of-block emissions in practice are often lower than the regulatory masks that we set in our licences. We accounted for this in our coordination between Shared Access users and other users in our statement on [Enabling wireless innovation through local licensing](#) in 2019. Specifically, we have assumed that emission levels are 5dB lower in the adjacent 5 MHz and 10dB lower thereafter for the purposes of coordination. We proposed to adopt a similar approach when coordinating H3G with other users in the band and would use the assumed emission masks in Figure 1

¹ Draft licence changes from May 2024 consultation [Annex 3 - Draft licence](#)

for H3G transmissions. We would co-ordinate all H3G assignments using the equivalent non-AAS emission masks, as these also reflect the AAS base stations (based on TRP + 21dBi assumed antenna gain).

Figure 1: Our proposed out-of-block emission levels for coordination of H3G base stations with other users as proposed in our May 2024 consultation



Responses to consultation

2.4 Ofcom received 10 responses to the May 2024 consultation, several of which expressed concern about the proposed increase in the out-of-block emission mask including, the BBC, The University of Strathclyde and two Shared Access users. The respondents noted that the change amounted to a 49dB increase from -36dBm/5 MHz to +13dBm/5 MHz. As a result, we are providing some additional analysis to show that the effect of the proposed changes to H3G’s OOB emission limits are unlikely to be significant for Shared Access users.

Assessing interference

2.5 Interference from one system into another at an adjacent frequency is a combination of both the OOB emissions from the interfering transmitter falling into the wanted channel of the victim receiver and the in-block emissions from the transmitter being picked up by the receiver’s adjacent channel. The combined impact of both these mechanisms is often modelled as Net Filter Discrimination (NFD). The NFD takes account of both the out of block emissions of the transmitter and the selectivity performance of the receiver. It provides an additional loss factor compared to when both transmitter and receiver are co-channel and therefore accounts for the frequency separation and transmitter and receiver performance.

2.6 Figure 2 shows H3G’s current and proposed, assumed emission mask. In addition, we have included the Shared Access receiver selectivity derived from 3GPP TS 38.104 for 100 MHz bandwidth.

2.7 Comparing the values for net filter discrimination between H3G and Shared Access using H3G's current 3.9 GHz OOB mask and the proposed new OOB mask, shows an approximate degradation of 0.1 dB in the interference environment as a result of the proposed OOB emission changes. This is due to the Shared Access receiver selectivity dominating the risk of interference and resulting NFD. Therefore, whilst there would be a significant increase in OOB emissions from H3G's base stations, the risk of interference to Shared Access users is unlikely to change significantly.

Figure 2: H3G current and proposed, assumed emission mask and Shared Access receive mask for 100 MHz bandwidth.

