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| **Title\*:** | Proposed receiver blocking values for 5.8GHz band |
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| input for **Committee**\***:** | BRAN |
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| Contribution **For\*:** | Decision |  |  |
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| Relevant WI(s), or deliverable(s): |   |
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**ABSTRACT:***This document and Ofcom other documents provides relevant information for the discussion on the appropriate values for receiver blocking performance in EN3012 502.*

1. **INTRODUCTION**

Ofcom believe that the receiver blocking values in current draft versions of some of the ENs being prepared by ETSI BRAN are not appropriate to ensure receivers have sufficient resilience to signals from adjacent systems. Most of the current values were taken from the draft of EN 300 328 compiled by TG11. These values are currently being reviewed and updated by TG11 for the subsequent version of EN 300 328. In our other paper we have included the current discussions within TG11 for information and reference purposes. We believe the final values used for each of the ENs should be based on a general principle that they should be fit for purpose but also be finalised after taking cognisance of, on a case by case basis, the typical interference scenarios for the systems and bands covered by the EN.

This document sets out some proposals for discussion and consideration for EN 302 502. BRAN is requested to take note and discuss the proposals set out below and to commit to bringing receiver characteristics in-line with the spirit of the analysis set out in our other inputs.

1. **Characteristics of incumbent services and applications**

Free Space Loss at 5.8GHz

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Distance** | **2m** | **5m** | **10m** | **20m** |
| **Free Space Loss** | -54 dB | -62dB | -68dB | -74dB |

Max e.i.r.p of neighbouring systems

|  |  |
| --- | --- |
| **System** | **Maximum TX e.i.r.p** |
| **Watts** | **dBm** |
| FBWA | 4 | 36 |
| Wi-Fi | 1 | 30 |
| SRD | 25 mW | 14 |
| ITS | 2 | 33 |
| Fixed Link (L6GHz) | 50 dBW | 80 |

Worst case signal levels (i.e. blocking) as seen by victim:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Interferer** | **2m** | **5m** | **10m** | **20m** |
| FBWA | -18dBm | -26dBm | -32dBm | -38dBm |
| Wi-Fi | -24dBm | -32dBm | -38dBm | -44dBm |
| SRD | -40dBm | -48dBm | -54dBm | -60dBm |
| ITS | -21dBm | -29dBm | -35dBm | -41dBm |
| Fixed Link (0°)1 | 26dBm | 18dBm | 12dBm | 6dBm |

1. Owing to the use of highly directional antennas with fixed links the values are the absolute worst case and in practice significantly lower levels are more likely e.g. at 90° from main beam the signal is 58dB down on main beam. A 40dB reduction is seen at 30° or less for some, from main beam.

The table below shows the signal levels at a number of different angles from a L6GHz point to point link.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Interferer** | **2m** | **5m** | **10m** | **20m** |
| Fixed Link (0°) | 26dBm | 18dBm | 12dBm | 6dBm |
| Fixed Link (30°) | -14dBm | -22dBm | -28dBm | -34dBm |
| Fixed Link (90°) | -32dBm | -40dBm | -46dBm | -52dBm |
| Fixed Link (180°) | -41dBm | -49dBm | -55dBm | -61dBm |

The current draft has blocking levels in the range of -47dBm to -59dBm which is felt to be insufficient.

As a comparison the blocking levels in the recently revised EN 301 908 standards for WiMAX have levels in the range of -15dBm to -44dBm, which compares well with the numbers above.

1. **Deployment scenarios.**

Taking the FBWA as the victim we need to consider the likely separation distances that a typical system would encounter.

A FBWA system will have two components, the subscriber point and the network point.

**Network point**

The network point is likely to be either connected to a fibre point to the main public network or a high capacity point to point link. In the latter case a separation distance between the two antennas of a couple of metres is quite possible given that a shared tower is most likely, although the respective antennas are likely to be off axis to each other. This would mean that the figures highlighted in green below should be the ones considered as typical blocking parameters.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Interferer** | **2m** | **5m** | **10m** | **20m** |
| Fixed Link (0°) | 26dBm | 18dBm | 12dBm | 6dBm |
| Fixed Link (30°) | -14dBm | -22dBm | -28dBm | -34dBm |
| Fixed Link (90°) | -32dBm | -40dBm | -46dBm | -52dBm |
| Fixed Link (180°) | -41dBm | -49dBm | -55dBm | -61dBm |

The other potential interference sources, i.e. SRD’s and WiFi are not expected to be seen and even if there were the signal levels would be well below those seen for Fixed Links.

**Subscriber point**

In terms of the subscriber point the most likely interferer will be Wi-Fi. Considering that the subscriber FBWA unit is likely to be mounted outdoors and high up on the property and the Wi-Fi access point and client devices are likely to be indoors, it is felt that a minimum separation distance of 5m is reasonable for a typical two storey dwelling. However, if single story dwelling are considered, and these are more common in rural areas than in urban areas then a 2m separation distance is quite feasible.

The other potential interferer will be the FBWA station from a neighbouring property. Given that FBWA solutions are generally used where fibre is considered too expensive because the demand is low (i.e. small number of geographically diverse consumers), it is unlikely that neighbouring FBWA stations will be closer than 10m to each other

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Interferer** | **2m** | **5m** | **10m** | **20m** |
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| Wi-Fi | -24dBm | -32dBm | -38dBm | -44dBm |
| Fixed Link (0°) | 26dBm | 18dBm | 12dBm | 6dBm |

1. **Proposed values for discussion**

Another issue being discussed was for BWFA systems that intended to operate in both of the outdoor 5GHz BFWA bands in Europe (5470 – 5725 MHz and 5725 – 5875 MHz). The proposals below give a suggested way ahead to solve this issue.

The two issues for discussion in relation to EN302 502 are:

1. The actual level of the blocking signal tests (we believe the current EN 301 893 based ones are too lenient, although we do not want to cause current equipment into a re-design cycle). In addition, the levels chosen are in line with the levels shown in the latest 802.16/WI-MAX standards.
2. The lower test frequencies that fall into the 5470-5725 Wi-Fi band may not be suitable if the equipment is designed around “dual-band” usage.

With these two aims in mind we propose the following modification top the table in clause 4.7.4 of the draft.

Table 4: Receiver Blocking parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Wanted signal mean power from companion device [dBm] | Blocking signal frequency[MHz] | Blocking signal power [dBm] | Type of blockingsignal |
| ~~Master or Slave with radar detection~~~~(see table D.2, note 2)~~ |
| Pmin + 6 dB | 567525925 | [~~-53~~] -40 | CW |
| Pmin + 6 dB | 547535575360256125 | [~~-47~~] -15 | CW |
| Note 1:   Pmin is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.6.3.3 in the absence of any Blocking signal.Note 2:   Where the equipment can operate in the 5470-5725MHz band this test shall be carried out at 5420MHzNote 3:   Where the equipment can operate in the 5470-5725MHz band this test shall be carried out at 5320MHz |
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