**Comments on ECC Deliverable**

**“Draft ECC Report 358”**

**1 Sources**

**Administration/Company/Entity: DECT Forum**

**Name of contributor: Roel Ottink**

**2 General Comments**

[Please provide here any general comments which do not contain specific change proposals or which are not related to specific sections of the deliverable. Please leave blank if not applicable]

**3 Proposals related to the ECC Deliverables**

**Note:** Contributors shall use the following table to provide comments. It is also encouraged to provide as an annex a separate document showing the proposals with track changes. Minor editorial corrections do not need to be recorded in the table. The table is used in the resolution meeting to record how each proposal is addressed.

*The* following information must be included.

* **Comment number**: Sequential numbering of comments in the format “XX/1”, “XX/2” etc, where “XX” is the organisation name or a suitable abbreviation. Administrations may use CEPT country codes
* **Section number/Clause**: Relevant section number of the deliverable, use numbers where applicable e.g. “1.1”, “A1.4”, “List of abbreviations”
* **Paragraph/Figure/Table**: Paragraph number in section, e.g. “1”,”2”.. or Figure/Table, e.g. “Figure 1”, “Table 2”
* **Type of comment**: “General”, “Technical” or “Editorial” depending on the nature of the proposed changes
* **Comment**: Background/justification for proposed changes
* **Proposed change**: Proposed modifications shown in revision marks where possible. For more complicated changes (e.g. proposed deletion/addition of whole sections) or changes to tables it is sufficient to refer to the annex including the changes

| **Comment number** | **Section number**  **Clause** | **Paragraph**  **Figure**  **Table** | **Type of comment**  (General,  Technical or  Editorial) | **Comment** | **Proposed change** |
| --- | --- | --- | --- | --- | --- |
| DF/1 | 0 | Bullet 2 | General | RadAlts and WAIC are not studied in this report | Delete “ with Radio altimeters (RA)\* and Wireless Avionics Intra-Communications (WAIC)\*\* on board aircraft in the frequency band 4.2-4.4 GHz”  Consequential deletion to \* and \*\* text, and add:  “Adjacent band studies between WBB LMP and radio altimeters (RA) are provided in ECC Report [XYZ] [1]. As parameters for WAIC above 4.2 GHz were not provided, no studies have been performed.” |
| DF/2 | 0 | Para starts “This Report includes…” | Edit |  | Add “a” to sentence to read:  This Report includes also a coexistence study between WBB LMP and VLBI Global Observing System (VGOS) stations operating in a few CEPT countries… |
| DF/3 | 0 | Power levels and antenna heights… | Edit | Reword paragraph and highlight TPC | The maximum power level for WBB terminals (Mobile, Nomadic, IoT, Machine, FWA) of 28 dBm EIRP is considered and Transmitter Power Control (TPC) activation is applied. For DECT-2020 NR the maximum power level is 23 dBm EIRP with a channel bandwidth of 6.912 MHz. It is noted that for DECT-2020 NR, the technical specification mandates that all radio devices within the network shall employ TPC, including the fixed radio device (or 'base station' in traditional cellular networks). |
| DF/4 | 0 | Studies on WBB LMP networks with no synchronisation to other WBB LMP nor to MFCN | Technical | To capture that fact that TPC is considered. Add bullet after bullet 2 (in set of 4 bullets) | the effect of TPC to mitigate interference into MFCN below 3.8 GHz from DECT-2020 NR and 3GPP terminals (including FWA terminals at 10 m antenna height). Studies show that when TPC is deployed in WBB LMP devices it can reduce the probability of interference into MFCN and its impact i.e. on throughput loss; |
| DF/5 | 0 | Adjacent channel coexistence for WBB LMP networks with synchronisation to other WBB LMP and MFCN | Technical | To highlight the fact than synchronisation does not benefit all interference mechanisms | Add paragraph:  It is noted that synchronisation is only an effective mitigation when considering base-to-base or terminal-to-terminal adjacent channel interference. When considering base station interference into adjacent channel terminal receivers, or terminal interference into adjacent channel base station receivers, synchronisation provides no benefit to coexistence. This is also the case for semi-synchronised operation. |
| DF/6 | List of Abbreviations |  | Edit | Add TPC to abbreviations | TPC – Transmitter Power Control |
| DF/7 | 2.1.4 | after bullets | Technical | To highlight the fact than synchronisation does not benefit all interference mechanisms | However, it is noted that synchronisation (or semi-synchronisation) is only effective when considering base-to-base or terminal-to-terminal adjacent channel interference. When considering base station interference into adjacent channel terminal receivers, or terminal interference into adjacent channel base station receivers, synchronisation provides no benefit to coexistence. |
| DF/8 | 3.2.1 | 1st para | Edit | Editorial changes and reference to EC Implementing Decision on MFCN (number of EC Decision to be provided) | The 3400-3800 MHz band is harmonised for MFCN in CEPT (and in the EU in accordance with EC Decision [Ref]) and is recognised to be the 5G primary band in Europe. |
| DF/9 | 3.2.2 | 1st para | Edit | Editorial correction | As a result a limited number of FSS earth stations have been maintained in the band below 3800 MHz. |
| DF/10 | 4.1 | Para after Table 2 | General | Provide reference to other use case study in Annex 3, plus editorial amendment | It should be noted that vertical industries will have different connectivity requirements. Some use-cases may be time-critical in nature and have strict requirements, such as strict latency and reliability requirements as well as requirements for flexible UL/DL ratios. For example, one use case study for wireless video used in Programme Making and Special Events showed equipment used the uplink biased 2:7 TDD frame structure compared with the 3:1 frame structure used by MFCN (see Annex 3.2). |
| DF/11 | 4.1 | 2nd Para after Table 2 | General | Hanging paragraph  “The wide range of local use-cases, used across different industrial and non-industrial environments both indoors and outdoors, will benefit from harmonised technical conditions” | Propose delete or amend appropriately |
| DF/12 | 4.2.2.1 | 1st para | Edit | Improvement to text | Table 11 summarises the technical parameters of DECT devices used in studies. These parameters are taken from the ETSI TS 103 636-2 v1.4.1 [7], with modified noise figures due to higher frequencies. The requirements in the specification apply to all DECT-2020 NR devices as no distinction between 'base station' equipment or 'user device' equipment. Devices within a DECT-2020 NR network may be considered a radio device fixed terminal (RDFT) or radio device portable terminal (RDPT) and can dynamically change their roles depending on the network’s needs. Consequently, only a single set of parameters for DECT-2020 NR is considered, i.e. all technical parameters for radio devices in Table 11 apply equally to all devices in the WBB LMP network. |
| DF/13 | 4.2.2.1 | Table 11 | Edit | Add row for TPC  Editorial correction on Rx receiving level | Transmitter Power Control - In the range -40 dBm to Max EIRP (23 dBm)  20 dB to reference sensitivity  20 dB to reference sensitivity |
| DF/14 | 5.2.1.1 | Table 23, 1.1 – Antenna pattern | General | Text reads:  “Refer to the extended AAS model in Table A of Annex 3”  But this is not the correct reference | Correct reference in table |
| DF/15 | 6.1.2 | 5th para | Edit | Editorial | The separation distance D corresponding to 5%, 10%, 20%, and 30% throughput loss for each case was obtained |
| DF/16 | 6.1.2 | Bullet 1 after Table 31 | Technical | To reflect the fact that synchronisation does not address all interference mechanisms | 1) Synchronisation between two neighbouring local area networks which may address base-to-base or terminal-to-terminal adjacent channel interference only |
| DF/17 | 6.1.3 | Table 32 | General | Separation distances from Orange's study do not seem to come from the study referenced in para 6.1.2 (and linked in the annex 1.1.2) | Provide correct reference |
| DF/18 | 6.4.3.1 | 1st para | Edit | Editorial improvement | In the co-channel case with 100 MHz 3GPP WBB channels, one 6.912 MHz DECT-2020 NR interferer has been assumed to be operating in each 10 MHz of the 100 MHz 3GPP WBB channel to assess the effect of aggregated interference from DECT-2020 NR, which represents the theoretical worst case and not necessarily experienced in practice. |
| DF/19 | 7.1.2 | 3rd para | General | Text notes that the study itself does not adequately model the scenario. If this is the case what is the relevance of this study in the report? | To note. No proposal |
| DF/20 | 7.1.2 | 5th para | General + edit | Three points separated into numbered bullet points to aid readability.  Correct MPCN to MFCN  Add text to note synch and semi-synch does not address all interference mechanisms | 1. For unsynchronised operation between WBB LMP in 3800-3860 MHz and 5G MFCN below 3800 MHz is difficult without coordination; 2. The LMP BS with in-band power level <= 30 dBm/100 MHz in 3860-4200 MHz can co-exist with 5G MFCN below 3800 MHz in unsynchronised operation without coordination; 3. synchronization or semi-synchronization between WBB LMP and 5G MFCN is a good solution to ensure a good co-existence when considering BS-to-BS or terminal-to-terminal interference |
| DF/21 | 7.1.3 | 3rd para | Edit | Two points separated into numbered bullet points to aid readability. | WBB low power non-AAS BS with an EIRP of 31 dBm/100 MHz with an antenna gain of 12 dBi is considered. Two types of WBB medium power base stations are considered:   1. Non-AAS BS with transmit power of 49 dBm/100 MHz EIRP and 51 dBm/100 MHz EIRP with an antenna gain of 16 dBi; 2. AAS BS with 4x4 AAS antenna configuration (antenna gain 18.5 dBi), the AAS BS transmit power of 49 dBm/100 MHz EIRP (30.5 dBm/100 MHz TRP) and 51 dBm/100 MHz EIRP (32.5 dBm/100 MHz TRP). |
| DF/22 | 7.1.3 | Bullet 4 between Tables 44 and 45 | Edit | To note 10 m antenna height for terminals were studied.  Synchronisation is not relevant here as the analysis is into the BS receiver, and an adjacent synchronised terminal will have maximum interference as it will be transmitting while the adjacent channel BS is in receive mode | The regulatory technical conditions for WBB LMP terminals, operating with antenna heights up to 10 m, in 3800-4200 MHz with 5G MFCN below 3800 MHz - Table 45 |
| DF/23 | 7.1.4 | Para above Table 46 & Table 46 | General | Reduction of separation distances given in percentages. Would be useful to include the actual distances. Could not find these tabled in the study | Propose separation distance values are added. |
| DF/24 | 7.2.1 | 1st para | Edit | Editorial to improve text | This analysis adopts a Monte Carlo approach to assess the risk, from a statistical basis, of interference into MFCN on the basis that the location of MFCN base stations may not be known i.e.no geographical separation distance between WBB LMP and MFCN can be assumed. |
| DF/25 | 7.2.1 | 2nd para | Edit | Editorial to improve text | The analysis applies the agreed technical and propagation parameters and the protection requirements for the MFCN base station receiver. Net Filter Discrimination is used to combine the DECT-2020 NR transmitter spectrum emission mask (from Table 14) and MFCN receiver mask (based on values taken from the relevant parameters in this report from Table 25) into an NFD value |
| DF/26 | 7.2.1 | 3rd para | Edit | Editorial to improve text | The study assumes outdoor operation of 6.912 MHz bandwidth DECT-2020 NR operating in the centre of the 10 MHz channel raster at 23 dBm e.i.r.p. (0 dBi antenna gain) with transmission power control giving a range of EIRP from -40 dBm to 23 dBm (see ETSI TR 103 943 V1.1.1 (2024-01) [9]) |
| DF/27 | 7.2.1 | 4th para | Edit | Editorial to improve text | The DECT-2020 NR device is also randomly placed within the base station service area and the interference from DECT-2020 NR at the base station receiver is calculated based on the agreed parameters set out in this Report. |
| DF/28 | 7.2.1 | 5th – 7th para plus numbered list and equation | Edit | Update to text to summarise revised and corrected study presented to 63rd ECC | At each snapshot the parameters that can change within the Monte Carlo simulation are:   1. Victim antenna relative gain, i.e. the base station gain in the direction of the DECT-2020 NR radio device. 2. Transmit power of the DECT-2020 NR radio device via transmission power control. 3. Pathloss between DECT-2020 NR radio device and MFCN base station (ITU-R Recs P.452 and P. 2108 losses are independently variable).   To statistically characterise the risk of interference the simulation is carried out for 500,000. The probability where the interference from DECT-2020 NR device exceeds the protection threshold of -6 dB I/N at the base station receiver is given by:  Probability of interference = ∑Snapshots where protection criterion is exceeded / ∑Snapshots  As can be seen in Table 58, the analysis indicates that for DECT-2020 NR operating with TPC at 3.805 GHz the probability where DECT-2020 NR transmitters exceed the protection criterion of -6 dB I/N for MFCN is 1.76% and improves to 0.515% as the frequency separation is increased to 3.915 GHz (where the NFD levels off). |
| DF/29 | 7.2.1 | Table 58 | Edit | Title of table amended and table updated with new values based on revised and corrected study | **Table 58: Probability of DECT-2020 NR radio device exceeds -6 dB I/N at the MFCN base station receiver (Urban Macro case)**  See Annex for updated table 58 |
| DF/30 | 7.2.2 | Conclusion | Edit | Conclusion added on study | Within a DECT-2020 NR network, all devices have the same technical characteristics even if they have different roles within the network, and all devices implement TPC regardless of whether they are a ‘base station’ (sink node) or ‘terminal’ (router or leaf node). All messages, including beacon transmissions are adjusted to cover the 'next hop' devices and not to cover as wide an area as possible. Consequently, within a DECT-2020 NR network the average radio device transmit power is much lower than the maximum transmitter output power, and an average out-of-band emission (OOBE) level would be much lower than the specified OOBE level. This is an inherent feature of the automatic interference management capability of DECT-2020 NR to reduce transmitted power and therefore reduce the risk of interference to other users.  The results of this study indicate a low probability of interference into MFCN from DECT-2020 NR WBB LMP devices operating at a maximum of 23 dBm e.i.r.p. and employing transmission power control. When this study is coupled with results from Study 3, which conclude that radio devices operating at 28 dBm EIRP with an antenna height of 10 m can coexist with MFCN providing that TPC is used (see Table 45), the effectiveness of TPC to mitigate interference is demonstrated.  On the basis of this study (and Study 3), it is concluded that DECT-2020 NR operating at 23 dBm with TPC does not present a risk of harmful interference into MFCN. As the technical specification for DECT-2020 NR requires TPC in all devices, this conclusion holds for devices operating as 'base stations' and 'terminals'. |