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| **Radiocommunication Study Groups** |  |
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| Source: The Fifth Generation Mobile Communications Promotion Forum | **Document 5D/755-E** |
| **20 September 2021** |
| **English only**  **TECHNOLOGY ASPECTS** |
| Director, Radiocommunication Bureau[[1]](#footnote-1)\* | |
| FINAL Revised evaluation results (KPIs requesting CA) from The Fifth Generation Mobile Communications Promotion Forum on the IMT-2020 proposal in Document IMT-2020/18(rev.1) by “Nufront” IN THE EXTENDED IMT-2020 EVALUATION PROCESS | |
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This document describes the final updated evaluation result of User experience data rate, Area Traffic Capacity, Bandwidth and scalability – up to 1 GHz by 5GMF Evaluation Group regarding the IMT-2020 candidate technology submission in Document [IMT-2020/18(Rev.1)](https://www.itu.int/md/R15-IMT.2020-C-0018/en) by “Nufront”. The candidate technology was evaluated as the reset to Step 4 in the extended IMT-2020 evaluation process. The WG Technology Aspects (Option 2) meeting in August 2021 invited Nufront and 5GMF to continue the dialog on the outstanding issues, according to the agreed actions for closure of the process for Working Party (WP) 5D meeting #39. The agreed actions for the technical performance requirements above are described in [Annex 8 to Document 5D/746](https://www.itu.int/dms_ties/itu-r/md/19/wp5d/c/R19-WP5D-C-0746!N08!MSW-E.docx).

1. **Support of spectrum aggregation**

After the WG Technology Aspects (Option 2) meeting in August 2021, 5GMF had an e-meeting and correspondence with Nufront on the spectrum aggregation or CA (Carrier Aggregation). The following documents were exchanged and discussed:

1. Nufront’s document for
   * the general clarifications about CA, and
   * CA procedure and related sections in EUHT specification
2. 5GMF’s questions in the following technical areas
   * transmit and reception of BCF-TLV frame in CA mode
   * STA detects and accesses CCs of multiple cells (CAPs)
   * STA power control in uplink CA mode
   * STA behavior for system synchronization in CA mode
   * RSSI reporting
   * Handover
3. Nufront’s answers for the questions above.

The documents exchanged are attached below.



**2 5GMF Observation**

5GMF appreciates very much the elaboration from the proponent on spectrum aggregation. While the proponent provided some explanations, 5GMF is still of the view that the spectrum aggregation is not supported by the EUHT technology. Some of 5GMF’s key observations on the EUHT technology are summarized below:

1. From the EUHT specification (Attachment 5.4 to Document [5D/222](https://www.itu.int/md/R19-WP5D-C-0222/en)) and also the explanations from the proponent, 5GMF understands that the intended operation for spectrum aggregation from the EUHT technology is such that each of the carriers operates independently, i.e. each carrier/CAP should include the complete set of signaling/channels needed for initial access and subsequent data transfer. However, the EUHT technology on spectrum aggregation, based on its specification, will unavoidably lead to the consequence of a STA connected to multiple CAPs, since the STA treats each carrier independently and thus the STA may connect to different CAPs on different carrier frequencies based on the initial access procedure disclosed in the EUHT specification. This is demonstrated by the Nufront elaborations in 3) in Section 1 of this document. Those are as follows.
   * *There is one MAC entity in STA which uniformly manage all the CCs, even those CCs belong to different cells.*
   * *STA can obtain the CA-related information from BCF broadcasted from CAPs. It doesn’t matter if the number of CCs of CAPs is same or not. For example, if CAP#1 has 4 CCs while CAP#2 has 3 CCs, the STA will have this information from the BCF from CAP#1 and CAP#2. If this STA has capability to support 7 CCs, it can connect to CAP#1 and CAP#2.*

Unfortunately, one of the critical issues is that a method of EUHT technology would fail to reassemble data units when these data units are transferred over carriers which belong to different CAPs. This indicates that the EUHT technology does not support spectrum aggregation.

1. The EUHT technology does not provide many essential details in its specification on how the spectrum aggregation shall be operating, including bit value mapping rule, signaling, interface and entity, etc. Due to such lack of information in the EUHT technology, it is not possible to achieve inter-operability and the potential for wide industry support, which is the objective of consensus building in the IMT-2020 development process. This is manifested by the responses from the proponent that such details are up to proprietary implementation. However, 5GMF’s view is that inter-operability is a pre-requisite for any IMT-2020 technology.

For more detailed comments, refer to Part II D) section 1.3 “EUHT CA for eMBB evaluation” in the 5GMF revised evaluation report (Doc. [5D/740](https://www.itu.int/md/R19-WP5D-C-0740/en)).

**3 Conclusion**

5GMF had investigated the support of CA in the candidate technology Document [IMT‑2020/18(Rev.1)](https://www.itu.int/md/R15-IMT.2020-C-0018/en) proposed by “Nufront proponent” after WG Technology Aspects (Option 2) meeting in August 2021. 5GMF concluded that the final evaluation result in the August 2021 meeting for User experience data rate, Area Traffic Capacity, Bandwidth and scalability – up to 1 GHz would be also valid and applied as the conclusion of Step 4 in WP 5D #39.

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1. \* Submitted on behalf of The Fifth Generation Mobile Communications Promotion Forum (5GMF). [↑](#footnote-ref-1)