**3GPP SA WG2 Meeting #164 *S2-2408513***

**Maastricht, NL, 19-23 August 2024 *(was S2-240xxxx)***

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **23.501** | **CR** | **5596** | **rev** | **-** | **Current version:** | **19.0.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network | **x** | Core Network | **x** |

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| ***Title:***  | Adding support of Mobile Wireless Access Backhaul in 5GS  |
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| ***Source to WG:*** | Qualcomm Incorporated, Nokia, LG Electronics, IIT Bombay |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | VMR\_Ph2 |  | ***Date:*** | 2024-08-19 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***Release:*** | Rel-19 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | The approved VMR\_Ph2 work item (SP-240632) is set to specify the architecture enhancements, functionalities and procedures to support MWAB based on conclusions of TR 23.700-06 (clause 8).This contribution added the general description of the MWAB feature and corresponding architecture enhancements in TS 23.501.  |
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| ***Summary of change:*** | Add general description of the system architecture for MWAB support in new clause 5.x.  |
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| ***Consequences if not approved:*** | No support of VMR\_Ph2 feature in Rel-19.  |
|  |  |
| ***Clauses affected:*** | (new) 5.x |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

*FIRST CHANGE*

5.x Support for Mobile gNB with Wireless Access Backhauling (MWAB)

### 5.x.1 General

#### 5.x.1.1 Principles and functional entities

Mobile gNB with Wireless Access Backhauling (MWAB) provides an NR access link to UEs in proximity and connects wirelessly to the 5GC through an IP connectivity provided by a backhaul PDU session(s), as illustrated in figure 5.x.1.1-1. The MWAB consists of a gNB component (MWAB-gNB) and a UE component (MWAB-UE). The MWAB-gNB is based on the gNB functionality specified in TS 38.300 [27] and TS 38.401 [42]. The UE(s) served by the MWAB-gNB may or may not move together with the MWAB, e.g. the MWAB may be mounted on a moving vehicle and UEs may locate inside or outside the vehicle.

Both scenarios when MWAB-UE is non-roaming and MWAB-UE is roaming are supported. UEs served by MWAB may be non-roaming or roaming in the PLMN advertised by the MWAB in system information which is also referred to as MWAB Broadcasted PLMN. The subscribed SNPN of UEs may be different from the SNPN advertised by the MWAB in system information which is also referred to as MWAB Broadcasted SNPN.



Figure 5.x.1.1-1: Non-Roaming MWAB architecture for 5GS

NOTE 1: In this release, the CU/DU split of the MWAB-gNB is not supported.

NOTE 2: The interface between MWAB-UE and MWAB-gNB is not in scope of this specification.

MWAB operation supports both PLMN and SNPN cases. The specific architectures for supporting PLMN are provided in clause 5.x.1.2, and the architectures for supporting SNPN are provided in clause 5.x.1.3.

MWAB-UE has a single NR Uu hop to the Backhaul (BH) NG-RAN, using either TN or NTN access technology. NR access is used for the radio link between a MWAB-gNB and the served UEs. The NR Uu access link between the MWAB-gNB and the served UE(s) does not use NTN access technology. 5G MOCN is supported by the MWAB-gNB.

The MWAB-UE can be authorized by the BH 5GC to operate as MWAB, and establishes the necessary BH PDU Session(s). The detailed procedures for the authorization of MWAB are described in clause 5.x.3.

The IP based BH PDU Session(s) of the MWAB-UE in the BH PLMN/SNPN is used for the MWAB-gNB's connection to the OAM server in the PLMN/SNPN serving the UE(s), and the N2, N3, and Xn interfaces. The BH PLMN/SNPN and the PLMN/SNPN serving the UE can be the same or different. Same or different PDU Sessions of the MWAB-UE can be used for carrying the above traffic.

NOTE 3: The use of multiple PDU Sessions for N2, N3, Xn, OAM access, follows the existing URSP logic as defined in TS 23.503 [45].

The MWAB is configured with the address(es) of the OAM server of the MWAB Broadcasted PLMN/SNPN and obtains the corresponding configurations for the MWAB-gNB from this OAM server. The details of the MWAB configuration/provisioning process are described in clause 5.x.2.

Service continuity for the UE(s) served by the MWAB-gNB is supported, when the MWAB moves and the UE(s) move or do not move together with the MWAB. The detailed procedures for the support of mobilty are described in clause 5.x.5.

The MWAB shall be able to serve UE(s) with any MWAB specific enhancements. For certain operations, the MWAB may be configured to provide access to only certain UEs. Existing access control mechanisms, e.g. CAG control, can be used to manage the UE(s)'s access to the MWAB-gNB. The details of the access control of the UEs served by MWAB are described in clause 5.x.6.

The LCS framework as defined in TS 23.273 [87] is used for providing the location service to the UE(s) served by MWAB. Details on supporting the LCS over MWAB are described in clause 5.x.7.

Regulatory services (e.g. emergency services, priroity services) can be supported by the MWAB, and the details are provided in clause 5.x.8.

#### 5.x.1.2 Architectures to support MWAB in PLMN case

Figure 5.x.1.2-1 presents an example architecture for the MWAB operation when no roaming was involved for the MWAB-UE. In this case, there may be two PLMNs involved, i.e. the BH PLMN that serves the MWAB-UE, and the MWAB Broadcasted PLMN that serves the UE connected to the MWAB. In some cases, the BH PLMN and the MWAB Broadcasted PLMN can be the same PLMN.

The MWAB-gNB logically belongs to MWAB Broadcasted PLMN and announces the PLMN IDs of the MWAB Broadcasted PLMN. The MWAB-gNB establishes N2 and N3 connection with the UE AMF and UE UPF in the MWAB Broadcasted PLMN via the PDU session of the MWAB-UE established with BH PLMN.

The BH UPF in the BH PLMN serves the MWAB-UE and provides the connection via a N6 interface towards the MWAB Broadcasted PLMN, to carry the N2 and N3 traffic from MWAB-gNB. The BH UPF also supports the access to the OAM servers in the MWAB Broadcasted PLMN by the MWAB-gNB.

NOTE: Depending on deployment requirement, a security gateway may be required between the BH UPF and the MWAB Broadcasted PLMN network. In that case, the MWAB-gNB need to connect to the security gateway based on pre-configured security credentials. The traffic between MWAB-gNB and the MWAB Broadcasted PLMN goes inside the security tunnel established via the security gateway.

UE connected to the MWAB-gNB can access the 5GS services offered by MWAB Broadcasted PLMN. No MWAB specific enhancement to the UE is required. The UE connected to the MWAB-gNB is not aware of the BH PLMN, and thus does not need any roaming agreement between its HPLMN and the PLMN 1.



Figure 5.x.1.2-1: Architecture for MWAB operation support - non-roaming

Figure 5.x.1.2-2 presents an example architecture for the MWAB operation when MWAB-UE is roaming with a Local Breakout PDU Session for its operation. In this case, there may be three PLMNs involved, i.e. the BH PLMN that serves the MWAB-UE, and the MWAB Broadcasted PLMN that serves the UE connected to the MWAB, and the HPLMN of the MWAB-UE. The use of the Local Breakout PDU Session by the MWAB-UE can be configured by its HPLMN, e.g. with some VPLMN specific URSP rules. In some cases, the BH PLMN and MWAB Broadcasted PLMN can be the same PLMN.

The BH PLMN can access the MWAB-UE's HPLMN UDM for the subscription information. The rest of the operations are similar to that shown in figure 5.x.1.2-1.



Figure 5.x.1.2-2: Architecture for MWAB operation support - MWAB-UE roaming with Local Breakout

Figure 5.x.1.2-3 presents an example architecture for the MWAB operation when MWAB-UE is roaming with a Home Routed PDU session for its operation. In this case, PDU session of the MWAB-UE is routed by BH PLMN to the HPLMN of the MWAB-UE. The rest of the operations are similar to that shown in figure 5.x.1.2-2. In some cases, the BH PLMN and MWAB Broadcasted PLMN can be the same PLMN.

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**Figure 5.x.1.2-3: Architecture for MWAB operation support - MWAB-UE roaming with Home Routed**

In figure 5.x.1.2-1, figure 5.x.1.2-2 and figure 5.x.1.2-3, if the UE served by the MWAB is roaming, there can be another PLMN (not shown in the figures), i.e. the HPLMN of the UE served by the MWAB, involved. The interaction of the HPLMN of the UE and the MWAB Broadcasted PLMN follows that described in clause 4.2.4 for the roaming case. The UE served by the MWAB-gNB is not aware of BH PLMN, and thus does not need any roaming agreement between its HPLMN and the BH PLMN.

#### 5.x.1.3 Architectures to support MWAB in SNPN case

The MWAB operation also supports SNPN, and the corresponding architectures are presented in figure 5.x.1.3-1 and 5.x.1.3-2. The MWAB operation also supports mixed PLMN and SNPN operation, i.e. in the architecture presented in 5.x.1.3-1 and 5.x.1.3-2, the BH SNPN can be replaced by a PLMN and MWAB Broadcasted SNPN remains a SNPN. The SNPN operations as described in clause 5.30 apply to the MWAB-UE and the UE served by the MWAB-gNB.

Figure 5.x.1.3-1 presents an example architecture for the MWAB operation when the serving SNPN of the MWAB-UE is the same as subscribed SNPN of MWAB-UE. In this case, there may be two SNPNs involved, i.e. the BH SNPN that serves the MWAB-UE, and the MWAB Broadcasted SNPN that serves the UE connected to the MWAB-gNB. The MWAB-gNB logically belongs to MWAB Broadcasted SNPN and establishes N2 and N3 connection with the UE AMF and UE UPF via the PDU session of the MWAB-UE established with BH SNPN. MWAB-gNB announces SNPN ID of MWAB Broadcasted SNPN.

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**Figure 5.x.1.3-1: Architecture for MWAB operation support for SNPN – with MWAB-UE served by the subscribed SNPN (BH SNPN)**

Figure 5.x.1.3-2 presents an example architecture for the MWAB operation when the MWAB-UE accesses its serving SNPN using credentials owned by a Credential Holder. In this case, besides the two SNPNs, i.e. the BH SNPN that serves the MWAB-UE, and the MWAB Broadcasted SNPN that serves the UE connected to the MWAB-gNB, the Credential Holder of MWAB-UE is also involved. The MWAB-gNB logically belongs to MWAB Broadcasted SNPN and establishes N2 and N3 connection with the UE AMF and UE UPF via the PDU session of the MWAB-UE established with BH SNPN. MWAB-gNB announces SNPN ID of the MWAB Broadcasted SNPN.

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**Figure 5.x.1.3-2: Architecture for MWAB operation support for SNPN – with MWAB-UE accesses BH-SNPN with credentials from a CH**

#### 5.x.1.4 Support of QoS for MWAB operations

If QoS optimization of the N3 connection is required, the MWAB-gNB may be configured with the traffic mapping to DSCP values used in the Broadcasted PLMN/SNPN for TNL in N3 connections (as defined in TS38.414 [ x]), and the mapping of DSCP values in the Broadcasted PLMN/SNPN to a 5QI in the BH PLMN.

The DSCP values are used in the QoS Flow binding of the BH PDU session used for N3 connection(s) using the designeated 5QI based on existing procedures.

#### 5.x.1.5 Support of network slicing over MWAB

Network Slicing is supported over MWAB-gNB for UEs served by the MWAB. To support UEs' access to different slices in the MWAB Broadcasted PLMN, the MWAB-gNB may trigger establishment of separate BH PDU Sessions for the corresponding N2 and N3 interfaces for the UEs, e.g. accessing different AMFs or UPFs in the MWAB Broadcasted PLMN.

The determination of the use of the same or different BH PDU Sessions is based on the MWAB-UE URSP rules configured by the MWAB-UE HPLMN or BH PLMN. The MWAB-gNB interacts with MWAB-UE using an MWAB internal interface to influence the mapping of the N2 and N3 traffic to the BH PDU Session(s).

*End of CHANGEs*