3GPP TSG-RAN WG3 #127bis R3-252303

Wuhan, China, 4th – 11th, April, 2025

Agenda Item: 12.2

Source: NTTDOCOMO (moderator)

Title: Summary of Offline Discussion on additional topological enhancement

Document for: Approval

# For chair notes

## WAB

### Xn connection management

**1 FFS Include a WAB specific Indicator in the XN SETUP REQUEST and XN SETUP RESPONSE e.g. to prevent Xn establishment between WAB node**

**2 Include a WAB-MT Identifier in the XN SETUP REQUEST, XN SETUP RESPONSE, NG-RAN NODE CONFIGURATION UPDATE and NG-RAN NODE CONFIGURATION UPDATE ACK e.g. for colocation discovery for resource multiplexing.**

**3 FFS whether a single IE can achieve the same purpose.**

**Proposal 2-2: Xn connection between WAB-gNBs can be established.**

**Proposal 2-3: The WAB-gNB should be notified about the target BH-gNB for the WAB-MT HO.**

**Proposal 2-4: The WAB-gNB should be aware of whether the BH link for the WAB-MT is a terrestrial or a non-terrestrial one.**

**Proposal 2-1: WAB-gNB can reuse existing Xn-C TNL address discovery procedure to know the Xn-C TNL address of BH-gNB serving WAB-MT, then setup Xn with BH-gNB serving WAB-MT.**

**Proposal 2-2: BH-gNB can provide the Xn-C TNL address of neighboring gNB to WAB-gNB, so WAB-gNB can directly initiate Xn Setup with neighbour gNB.**

**Proposal 2-3: WAB-gNB can also use the neighboring cell information received from the BH-gNB to update its NCRT or initiate the Xn-C TNL address discovery procedure towards the neighboring gNB for further TNL/Xn Setup with the neighboring gNB, without waiting for the measurement report from UE (or WAB-MT).**

**Proposal 2-4: If Xn is to be avoided among WAB-gNBs, TNL discovery procedure can be enhanced to avoid Xn establishment as early as possible among WAB-gNBs.**

**Proposal 2: To avoid establishing Xn between two WAB-nodes, the WAB-node should be aware of the node type of another WAB-gNB.**

**Proposal 9: The BH-gNB which has WAB specific enhancement indicate whether the neighbour gNB is a WAB-gNB to the WAB-gNB to avoid unnecessary Xn setup between WAB-gNBs.**

### Resource coordination

**Proposal 1: When access and backhaul are operated out-of-band, there is no need for resource coordination.**

**Proposal 2a: RAN3 assumes that WAB deployments use out-of-band operation in case access and backhaul use different PLMNs.**

**Proposal 2b: In this release, In-band operation is only considered for scenarios, where access and backhaul use the same PLMN and the BH RAN can be upgraded with WAB-specific enhancements.**

**Proposal 4a: For WAB resource coordination , introduce a new class-1 Xn procedure between WAB-gNB and BH gNB.**

**The message contents can be based on relevant parts of the XnAP IEs defined in clauses 9.2.2.94-97 of TS 38.423.**

**FFS whether to reuse the F1AP GNB-DU RESOURCE CONFIGURATION procedure between BH gNB-CU and BH gNB-DU.**

**After RAN3 has finished resource coordination, RAN3 send an LS to inform RAN1.**

### Multi-hop prevention

**To be further discussed whether Solution 1 or Solution 3 (or both) need to be selected**

**1. For initial access, WAB-gNB may use dedicated frequencies and/or PCIs and potential other legacy OTA parameters (e.g. NR CGI), to ensure that the WAB-MTs of other WAB-nodes avoid (re)selecting the WAB-gNB cells.**

**3. For initial access, WAB-gNB-cells broadcast a new indicator in SIB to bar WAB-MT, and the WAB-MT avoids (re)selection of cells broadcasting this indicator.**

**Proposal 3: Solution 1 (dedicated OTA parameters) is used for preventing multihop WAB topology, and for prevention of Xn setup between WAB-gNBs.**

**Proposal 1: Multi hop prevention for initial access could be acheived by configuration or implementation. RAN3 to consider the following mechnisms for multi hop prevention during initial access:**

**- Solution 1: based on dedicated slice**

**- Solution 2: based on dedicated CAG ID or SNPN ID(s)/GIN(s)**

**- Solution 3: based on dedicated frequencies and/or PCIs**

**- Solution 4: based on allowed/forbidden cell list configured at WAB-node by OAM**

**Proposal 8: For multi-hop avoidance during WAB-MT initial access, RAN3 to agree that the WAB-gNB-cells broadcast a new indicator in SIB to bar WAB-MT.**

**Proposal 1-1: Multi-hop topology for idle mode WAB-MT can be avoided by solution 3.**

**Proposal 1-2: RAN3 send the LS to RAN2 on multi-hop topology avoidance as Annex A.**

### User location information

**Proposal 1: The Additional ULI can be updated at the AMF even if the WAB-gNB does not serve any UEs in RRC\_CONNECTED state.**

**RAN3 to agree the WAB-gNB reports new additional ULI to the network in a non-UA message when the MT’s serving cell changes.**

### WAB specific cause value

**Proposal 4: Discuss the introduction of WAB-specific cause values for XnAP and NGAP.**

### Backhaul type awareness

**Proposal 6: If the backhaul is NTN link, the WAB-gNB informs UE’s CN that the BH link RAT type is NTN.**

**Proposal 6: RAN3 discuss how a WAB node know the BH-gNB is using a satellite link. Possible options include BH-gNB informs WAB-gNB via Xn, or informs WAB-MT via RRC.**

**Proposal 2-4: The WAB-gNB should be aware of whether the BH link for the WAB-MT is a terrestrial or a non-terrestrial one.**

## 5G Femto

### LS on NR Femto node shared by PLMN and PNI-NPN

**The following sentences are agreeable.**

* The NR Femto may activate a physical cell shared by both PLMN and PNI-NPN, as specified in clause 4.6, through broadcasting both the *plmn-IdentityInfoList* and the *npn-IdentityInfoList-r16* in the SIB1, but without the *cellReservedForOtherUse*. ~~Then, this cell is accessible to UEs which have the allowed CAG list including a CAG-ID broadcasted by the cell. For the legacy UE not supporting CAG, this physical cell is viewed as a normal PLMN cell.~~

LG take the Reply LS (R3-252296)

Nokia take the TP (R3-252289)

### IP Version Selection and NR Femtos

**WA: If the SMF sends both IP versions in the *Transport Layer Address* IE, the NR Femto node selects the correct IP version.**

### DC

**Proposal 4: DC can be supported in NR Femto.**

### Slice Feature and Access Control for NR Femto

**Proposal 1: Slice Supported List per PLMN is not necessary to be transferred from NR Femto GW to NR Femto.**

**Proposal 2: Adopt Option 2 to 38.413.**

**Proposal 3: Use “*Requested NSSAI”* instead of “*Requested S-NSSAI”* similar as to the *Allowed NSSAI* IE used in 38.413.**

# Introduction

This document provides a summary of the offline discussion on additional topological enhancements.

# Discussion

## WAB

### Xn connection management

**Proposal 2-1: The WAB-gNB includes an ID of the co-located WAB-MT in the XN SETUP REQUEST or in the NG-RAN NODE CONFIGURATION UPDATE message sent to the BH-gNB.**

**1 FFS Include a WAB specific Indicator in the XN SETUP REQUEST and XN SETUP RESPONSE e.g. to prevent Xn establishment between WAB node**

**2 Include a WAB-MT Identifier in the XN SETUP REQUEST, XN SETUP RESPONSE, NG-RAN NODE CONFIGURATION UPDATE and NG-RAN NODE CONFIGURATION UPDATE ACK e.g. for colocation discovery for resource multiplexing.**

**3 FFS whether a single IE can achieve the same purpose.**

**Proposal 2-2: Xn connection between WAB-gNBs can be established.**

**Proposal 2-3: The WAB-gNB should be notified about the target BH-gNB for the WAB-MT HO.**

**Proposal 2-4: The WAB-gNB should be aware of whether the BH link for the WAB-MT is a terrestrial or a non-terrestrial one.**

**Proposal 2-1: WAB-gNB can reuse existing Xn-C TNL address discovery procedure to know the Xn-C TNL address of BH-gNB serving WAB-MT, then setup Xn with BH-gNB serving WAB-MT.**

**Proposal 2-2: BH-gNB can provide the Xn-C TNL address of neighboring gNB to WAB-gNB, so WAB-gNB can directly initiate Xn Setup with neighbour gNB.**

**Proposal 2-3: WAB-gNB can also use the neighboring cell information received from the BH-gNB to update its NCRT or initiate the Xn-C TNL address discovery procedure towards the neighboring gNB for further TNL/Xn Setup with the neighboring gNB, without waiting for the measurement report from UE (or WAB-MT).**

**Proposal 2-4: If Xn is to be avoided among WAB-gNBs, TNL discovery procedure can be enhanced to avoid Xn establishment as early as possible among WAB-gNBs.**

**Proposal 2: To avoid establishing Xn between two WAB-nodes, the WAB-node should be aware of the node type of another WAB-gNB.**

**Proposal 9: The BH-gNB which has WAB specific enhancement indicate whether the neighbour gNB is a WAB-gNB to the WAB-gNB to avoid unnecessary Xn setup between WAB-gNBs.**

### Resource coordination

**Proposal 1: When access and backhaul are operated out-of-band, there is no need for resource coordination.**

**Proposal 2a: RAN3 assumes that WAB deployments use out-of-band operation in case access and backhaul use different PLMNs.**

**Proposal 2b: In this release, In-band operation is only considered for scenarios, where access and backhaul use the same PLMN and the BH RAN can be upgraded with WAB-specific enhancements.**

**Proposal 4a: For WAB resource coordination , introduce a new class-1 Xn procedure between WAB-gNB and BH gNB.**

**The message contents can be based on relevant parts of the XnAP IEs defined in clauses 9.2.2.94-97 of TS 38.423.**

**FFS whether to reuse the F1AP GNB-DU RESOURCE CONFIGURATION procedure between BH gNB-CU and BH gNB-DU.**

**After RAN3 has finished resource coordination, RAN3 send an LS to inform RAN1.**

**Proposal 6: The BH gNB to determine the resource allocation across its own cells and the cells of all WAB-nodes.**

**Proposal 3a: For in-band operation, the Xn information exchange between WAB-gNB and BH gNB to follow the solution defined for IAB between F1-terminating IAB-donor and non-F1-terminating IAB-donor.**

**Proposal 3b: For in-band operation, the F1 information exchange between BH gNB-CU and BH gNB-DU to follow the solution defined for IAB between non-F1-terminating IAB-donor-CU and non-F1-terminating IAB-donor-DU.**

**Proposal 4a: For Xn information exchange between WAB-gNB-CU and BH gNB-CU, introduce a new class-1 procedure that exchanges for each WAB-gNB cell the information provided by the XnAP IAB Cell Information IE.**

**Proposal 4b: For F1 information exchange between BH gNB-CU and BH gNB-DU, reuse the F1AP GNB-DU RESOURCE CONFIGURATION procedure.**

**Proposal 5: A WAB-node and a BH-gNB can pre-emptively conduct resource coordination via Xn, i.e., before they have established a BH link. The WAB-node applies the pre-emptively established resource allocation as soon as it is connected to this BH gNB.**

**Proposal 6: The BH gNB to determine the resource allocation across its own cells and the cells of all WAB-nodes.**

**Proposal 5-1: For in-band backhauling in non-roaming scenarios, introduce a new XnAP procedure for a WAB-gNB and the WAB-node’s BH-gNB to support resource coordination of this WAB-gNB and its co-located WAB-MT.**

**Proposal 5-2: RAN3 assumes out-of-band backhauling when the WAB-gNB and the WAB-MT are served by different PLMNs.**

**Proposal 5-3: For in-band backhauling, discuss which parts of XnAP IEs defined in clauses 9.2.2.94-97 of TS 38.423 should be used in the procedure for WAB resource coordination.**

**Proposal 10: If the BH gNB uses CU-DU split architecture, similar F1 signaling designed for IAB resource multiplexing is used between the CU and DU parts of the BH-gNB for WAB.**

**Proposal 11: The BH-gNB configures WAB-gNB’s semi-static cell resource to the WAB-gNB via Xn signalling. And WAB-gNB sends its multiplexing capability to BH-gNB via Xn signalling.**

**Proposal 12: RAN3 to send an LS to RAN1 to check whether the attribute of soft and configuration of the availability of soft resources is supported in WAB.**

1. RAN3 to coordinate with RAN1 on whether the resource multiplexing coordination framework between backhaul link and access link for IAB can be reused for WAB, and whether the BH-gNB configures the resource of the WAB-gNB cells.

**Proposal 13: RAN3 to discuss whether BH-gNB considers cell specific signaling/channel resources as hard resources at the IAB-DU.**

**Proposal 14: WAB resource configuraiton of neighbour gNB is exchanged between WAB-gNB and BH-gNB, or between BH-gNBs via Xn signaling.**

**Proposal 15: BH-gNB sends its per-child MT link-NA resource configuration to the WAB-gNB via Xn.**

### Multi-hop prevention

**To be further discussed whether Solution 1 or Solution 3 (or both) need to be selected**

**1. For initial access, WAB-gNB may use dedicated frequencies and/or PCIs and potential other legacy OTA parameters (e.g. NR CGI), to ensure that the WAB-MTs of other WAB-nodes avoid (re)selecting the WAB-gNB cells.**

**3. For initial access, WAB-gNB-cells broadcast a new indicator in SIB to bar WAB-MT, and the WAB-MT avoids (re)selection of cells broadcasting this indicator.**

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**- Solution 1: based on dedicated slice**

**- Solution 2: based on dedicated CAG ID or SNPN ID(s)/GIN(s)**

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**- Solution 4: based on allowed/forbidden cell list configured at WAB-node by OAM**

**Proposal 8: For multi-hop avoidance during WAB-MT initial access, RAN3 to agree that the WAB-gNB-cells broadcast a new indicator in SIB to bar WAB-MT.**

**Proposal 1-1: Multi-hop topology for idle mode WAB-MT can be avoided by solution 3.**

**Proposal 1-2:** **RAN3 send the LS to RAN2 on multi-hop topology avoidance as Annex A.**

### User location information

**Proposal 1: The Additional ULI can be updated at the AMF even if the WAB-gNB does not serve any UEs in RRC\_CONNECTED state.**

**RAN3 to agree the WAB-gNB reports new additional ULI to the network in a non-UA message when the MT’s serving cell changes.**

### WAB specific cause value

**Proposal 4: Discuss the introduction of WAB-specific cause values for XnAP and NGAP.**

### Backhaul type awareness

**Proposal 6: If the backhaul is NTN link, the WAB-gNB informs UE’s CN that the BH link RAT type is NTN.**

**Proposal 6: RAN3 discuss how a WAB node know the BH-gNB is using a satellite link. Possible options include BH-gNB informs WAB-gNB via Xn, or informs WAB-MT via RRC.**

**Proposal 2-4: The WAB-gNB should be aware of whether the BH link for the WAB-MT is a terrestrial or a non-terrestrial one.**

### RAN2 impact

**Proposal 1: WAB-MT supports all RRC states and all types of SRBs.**

**Proposal 2: The behaviour of WAB-gNB in the Idle and Inactive states of WAB-MT requires further discussion in RAN2.**

**Proposal 3: The behavior of WAB-gNB during RLF or Beam Failure must be discussed in the RAN2 WI phase.**

**Proposal 4: The decision on whether WAB should support NCR and IAB should be made by RAN2.**

**Proposal 5: RAN2 should evaluate the necessity of including cell status and cell reservations, unified access control, and additional allowed or forbidden cell lists for WAB.**

### NG interface management

**Proposal 1-2: new “WAB-gNB” indication is needed in NG SETUP REQUEST message, to inform AMF that peer NG-RAN node is a WAB-gNB.**

**Proposal 7: NG suspend/resume is supported for NG connection management of a WAB-gNB.**

### Dual connectivity

**Proposal 4: WAB can support UE dual connectivity.**

**Proposal 4-1: In case the WAB-MT’s IP address is changed due to WAB node’s mobility, there is no need to introduce enhancement to handle the DC Xn-U traffic.**

### Prevent self access

**Proposal 9: RAN3 to agree that “MWAB-UE accessing MWAB-gNB belonging to same MWAB” is not an issue to be solved because this can be avoided by proper setting/implementation, and send reply LS to SA2.**

### WAB architecture using a tunnel

**Proposal 4: RAN3 to capture that a tunnel may be used to transfer the WAB-gNB’s traffic in TS 38.401.**

### 3.1.10 WAB authorization

**Proposal 3: Capture in Section X.1 of TS 38.401 that WAB-gNB is initialized by OAM if it is authorized as Annex B.**

**Proposal 2-1: In case that the WAB-gNB is authorized and the WAB-MT is not authorized, the WAB-gNB should perform the handover or release the served UEs, and the WAB-MT should release the BH PDU sessions when UE handover or releasing is completed.**

**Proposal 2-2: In case that the authorization status of WAB-MT is changed to authorized again, the WAB-MT will establish the BH PDU sessions again for WAB-gNB’s traffic if the authorization status of WAB-gNB is also authorized.**

**Proposal 2-3: In case that the WAB-gNB is not authorized and the WAB-MT is authorized, RAN3 needs to discuss how to handle the BH PDU session.**

### 3.1.11 WAB mobility

**Proposal 5-1: Single-gNB solution using different logical cells can be captured by TS 38.401.**

**Proposal 5-2: It’s up to implementation whether to use two-logical-gNBs solution or single-gNB solution. If two-logical-gNBs solution is used, OAM should configure a different gNB-ID for the new logical gNB.**

## 5G Femto

### 3.2.1 LS on NR Femto node shared by PLMN and PNI-NPN

**Observation 1: A physical cell shared between a PLMN and a PNI-NPN is served by separate logical nodes, one for PLMN and one for PNI-NPN.**

**Observation 2: Current initial access mechanism continues to work as expected with NR cells shared by PLMN and PNI-NPN.**

**Proposal 1: Capture the above in a reply LS to SA2; agree the draft in the Annex.**

**Proposal 1: The NR Femto cell shared by PLMN and PNI-NPN should broadcast different cell IDs for PLMN and PNI-NPN.**

**Proposal 2: The BL CR to TS 38.300 should be updated to support Approach 2 as follows:**

**The following sentences are agreeable.**

* The NR Femto may activate a physical cell shared by both PLMN and PNI-NPN, as specified in clause 4.6, through broadcasting both the *plmn-IdentityInfoList* and the *npn-IdentityInfoList-r16* in the SIB1, but without the *cellReservedForOtherUse*. ~~Then, this cell is accessible to UEs which have the allowed CAG list including a CAG-ID broadcasted by the cell. For the legacy UE not supporting CAG, this physical cell is viewed as a normal PLMN cell.~~

LG take the Reply LS

Nokia take the TP

**Proposal 3: It is proposed to agree the corresponding TP in Appendix and Relay LS to SA2 in [5].**

### 3.2.2 IP Version Selection and NR Femtos

**Proposal 1: A Rel-19 NR Femto node supporting a single IP version, connected to a 5GC (SMF) that supports both, or vice versa, does not seem like a relevant scenario.**

**Proposal 2: Deploying an NR Femto node in a single-IP-version domain (e.g. when connected to a 3rd party residential broadband transport) seems like a relevant scenario.**

**WA: If the SMF sends both IP versions in the *Transport Layer Address* IE, the NR Femto node selects the correct IP version.**

**Proposal 4: If an NR Femto GW is deployed, IP version selection may be done in the NR Femto GW.**

**Proposal 5: No NGAP impact is needed.**

**Proposal 6: Agree the TP in the Annex.**

1. Capture the functions for NR Femto that the AMF may send both IPv6 and IPv4 addresses in case of Femto GW which does not terminate user plane, and the Femto GW is responsible for selection of an IP address to be used for UP connectivity.
2. Agree the TP for the functions of IP address allocation and selection for NR Femto.

**Proposal 2: Same as legacy gNB, the NR Femto node selects an IP version for the NG-U tunnel if the NG-U configuration from CN contains two transport layer addresses of different versions. The NR Femto GW is not responsible for the IP version selection instead of NR Femto node.**

### 3.2.3 Mobility

**Proposal 1: To agree the LS to RAN2 on PCI configuration for NR femto in Annex.**

**Proposal 2: When handover a UE to a PLMN and PNI-NPN shared cell, even if the membership check for the UE is failed due to not-a-member, AMF or target NR femto can accept the UE as a non-member and continue the handover preparation procedure with an acknowledgement message.**

**Proposal 3: To agree the LS to SA2 on NR Femto node shared by PLMN and PNI-NPN in Annex.**

**Proposal 1: For the routing of HANDOVER REQUEST message from target NR Femto GW to correct target Femto node in case of NG-based HO, the AMF includes the information about target gNB (e.g., global gNB ID) in the HANDOVER REQUEST message before sending it to the target NR Femto GW.**

### 3.2.4 DC

**Proposal 4: DC can be supported in NR Femto.**

### Slice Feature and Access Control for NR Femto

**Proposal 1: Slice Supported List per PLMN is not necessary to be transferred from NR Femto GW to NR Femto.**

**Proposal 2: Adopt Option 2 to 38.413.**

**Proposal 3: Use “*Requested NSSAI”* instead of “*Requested S-NSSAI”* similar as to the *Allowed NSSAI* IE used in 38.413.**

# References

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| --- |
| **12. Additional topological enhancements for NR WI (RAN3-led)**WID [NR\_WAB\_5GFemto-Core]: [RP-243009](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_106/Docs/RP-243009.zip) (target: RAN #109) [TU: 1.5 (**1.5,** 1.5, 1.5)] |
| 12.1. General*Time plan, skeletons* |
| [R3-251546](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251546.zip) | (BL CR to 38.410 for Femto) Introduction of NR Femto in NGAP list of functions (ZTE Corporation, Nokia) | CR0052r2, TS 38.410 v18.2.0, Rel-19, Cat. B |
| [R3-251547](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251547.zip) | (BL CR to TS 38.413 for Femto) Support of NR Femto architecture with NR Femto Gateway (Nokia, Huawei) | CR1232r2, TS 38.413 v18.5.0, Rel-19, Cat. B |
| [R3-251548](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251548.zip) | (BL CR to 38.300 for Femto) Introduction of NR Femto Architecture and Protocol Aspects (Ericsson, Nokia, TMO US, AT&T, Verizon Wireless, BT, Charter, Huawei, LG Electronics, Samsung, Lenovo, Baicells, ZTE, NEC) | draftCR |
| [R3-251549](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251549.zip) | (BL CR to 38.305 for WAB) Support of Location Service Involving WAB-Nodes (ZTE Corporation, Nokia, Nokia Shanghai Bell, Ericsson, Qualcomm, Lenovo, CATT, Samsung, Huawei, China Telecom) | draftCR |
| [R3-251550](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251550.zip) | Support for Wireless Access Backhaul (Ericsson, ZTE, Nokia, Nokia Shanghai Bell, Huawei, Samsung, Lenovo, Qualcomm, Jio Platforms) | CR0439r6, TS 38.401 v18.5.0, Rel-19, Cat. B |
| [R3-251551](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251551.zip) | (BL CR to 38.413 for WAB) Additional ULI for UEs served by WAB-Nodes (Huawei, Ericsson, Nokia, Nokia Shanghai Bell, China Telecom, ZTE, Qualcomm, Samsung, CATT, Jio Platforms (JPL), Lenovo) | CR1263r1, TS 38.413 v18.5.0, Rel-19, Cat. B |
| [R3-251552](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251552.zip) | (BL CR to 38.455 for WAB) Support of Location Service Involving WAB-Nodes (Lenovo, ZTE Corporation, Nokia, Nokia Shanghai Bell, Ericsson, Qualcomm, CATT, Samsung, Huawei, China Telecom, Jio Platforms (JPL)) | CR0189r1, TS 38.455 v18.5.0, Rel-19, Cat. B |
| **12.2. Wireless Access Backhaul (WAB)** **QUOTA: 2***Specifications for the support of WAB including [RAN3]:** *Support of a WAB-node including a WAB-gNB and a WAB-MT.*
* *Support of backhauling of the WAB-gNB’s NG, Xn and OAM traffic over the WAB-MT’s PDU session(s).*
* *Support of Xn interface(s) by the WAB-gNB with the WAB-MTs serving BH RAN node and with other surrounding gNBs, including how to avoid setting up Xn between WAB-gNBs.*
* *Defining the behaviour of WAB-node in case the authorization status of WAB-MT and/or WAB-gNB changes.*
* *Network integration procedures for WAB nodes.*
* *Handling of WAB-gNB’s traffic (including Xn, NG and OAM traffic) during WAB-node mobility, including the case where the WAB-MT’s BH PDU session changes.*
* *Support the UE’s AMF change for UEs connected to, or camped on, a WAB-gNB.*
* *UE’s ULI that reflect the WAB node’s location.*
* *The handling of:*

*- PCI collision avoidance.**- Reconfiguration of TAC and RANAC on WAB-gNBs.**- Mechanisms to avoid multi-hop WAB topology.**- Radio-resource coordination between access and backhaul links.**- NG connection management.* *NOTE 1: For PCI collision avoidance and reconfiguration of TAC and RANAC on WAB-gNBs, follow the conclusion of mobile IAB.**NOTE 2: NG connection management should take the NTN conclusion into account, avoiding parallel discussions.**NOTE 3: No impact on the UE.**NOTE 4: Coordination with other WGs (e.g. SA2, RAN2) when needed.**NOTE 5: Backhaul link for WAB-MT can be TN or NTN.**NOTE 6: Mobility procedures to be used for the UEs served by a WAB-gNB are legacy UE mobility procedures. Mobility of the WAB-MTs is based on legacy UE mobility procedures.**NOTE 7: The interface between the WAB-MT and the co-located WAB-gNB is out-of-scope for the normative phase.**NOTE 8: Split architecture of the WAB-gNB is out-of-scope for the normative phase.**NOTE 9: RAN2 impact should be identified as early as possible, and should be minimal.* *The WAB-gNB is based on the gNB functionality specified in TS 38.300 and TS 38.401.* *The WAB-MT supports at least a subset of UE functionalities.**The NR Uu is used for the radio link between WAB-gNB and the served UEs.**The NR Uu radio link between the WAB-gNB and the served UEs does not use NTN.**WAB does not support the in band scenario if the backhaul link uses NTN.**The scenario where a WAB-gNB serves a WAB-MT(s) should be preventable by means of different standard based solutions.**RAN3 to specify solutions to prevent the multi-hop WAB topology, where multi-hop WAB means that a WAB MT connects to a WAB gNB. Discussions on multi hop WAB topology are out of scope.**The WAB-gNB and the WAB-MT may connect to the same PLMN or to different PLMNs.**The WAB-MT may connect to a public PLMN or an SNPN.**The WAB-gNB may connect to a public PLMN or an SNPN.* *Split gNB functionality for WAB gNB is out of scope.* *RAN3 to capture the following in the stage2 spec based on TR 38.799.* *WA: Additional ULI for WAB consists of TAI and NR CGI, which are determined by the WAB-node, reflecting the WAB-node’s physical location. This solution is compliant with Opton1 and Option3. It is up to SA2 to support one of Opton1 and Option3 or both.**Agree on Solution 2: For HO, the target WAB-gNB should reject HO preparation including the S-NSSAI used for Backhauling.**The “two logical gNB solution” can support UE’s AMF change during WAB-gNB mobility.**RAN3#127:**For User location information:**Include Additional ULI into the User Location Information IE in TS 38.413. Additional ULI contains a CGI and a TAI.* *In case the additional ULI has changed e.g. due to WAB-node movement, the WAB-gNB derives the new additional ULI and it reports it to the network, if required by the CN via legacy procedures. Add this description into TS38.401.**In case of WAB-MT connects via NTN, the Additional ULI is determined based on WAB-node geo-location. The latter applies to intra PLMN and inter PLMN cases.**SA2 should be informed of the above agreement.* *For WAB mobility:**Support and capture the two-logical-gNB solution for UE’s AMF change in 38.401.* *For Handling of WAB-gNB’s traffic during WAB-node mobility:**Capture in Stage 2 that, in case IPsec tunnel mode is used to protect WAB-gNB’s traffic, MobIKE can be used to avoid the change of inner IP address.* *RAN3 to capture in stage-2 that when WAB-gNB changes IP address due to WAB-node mobility, the WAB-gNB’s traffic can be handled in the following manner:* *NG-C and Xn-C can be migrated to the new IP address via legacy procedures defined in TS 38.412 and TS 38.422, respectively.**NG-U GTP-U tunnels can be migrated via the NGAP PDU session Resource Modify Indication procedure.**The migration of OAM traffic to the new IP address(es) is out of scope. Stage2 spec to capture the same text as for mobile IAB regarding the continuity of OAM connectivity as the node moves.**For PCI collision avoidance:**For WAB deployments, the legacy mechanism can be reused for PCI collision avoidance. PCI space can be partitioned by allocating a range of PCIs to WAB cells.* *Update the definition of mobile TRP in TS 38.305 to capture the case when the TRP belongs to a WAB-node. Capture in TS38.305 the WAB-MT UE ID as part of assistance data.**RAN3 to introduce in TS38.455 a new IE (e.g. WAB-MT UE ID IE) to indicate the UE ID of the WAB-MT in the TRP Information IE.* *For NG connection management:**Capture in TS38.401 that NG connection(s) removal for a WAB-gNB is supported.* *For WAB authorization:**TS 38.401 to capture RAN-related aspects of WAB-node authorization based on TS 23.501.* *When the authorization status of a WAB-gNB changes from “authorized” to “not authorized”:**The WAB-gNB node attempts to hand over and/or releases the UEs.**The NG and Xn connections of the WAB-gNB are removed.**As agreed in SA2, “backhaul PDU Sessions are available for the MWAB gNB to be able to perform OAM control shutdown, which may include handing ove the UEs it serves”**The above is based on SA2 conclusion to capture handling of the BH PDU sessions of the WAB-MT and the deregistration of WAB-MT.**Continue to work on the open issues and details…*  |
| [R3-251531](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251531.zip) | LS on MWAB-gNB Configurations (SA5(Samsung)) | LS in |
| [R3-251583](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251583.zip) | Functional Aspects of WAB-Nodes (Ericsson, Jio Platforms) | discussion |
| [R3-251584](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251584.zip) | (TP for WAB BL CR for TS 38.401) Functional Aspects of WAB-Nodes (Ericsson, Jio Platforms) | other |
| [R3-251619](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251619.zip) | Remaining aspects of WAB (Qualcomm Inc.) | discussion |
| [R3-251620](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251620.zip) | WAB radio resource coordination (Qualcomm Inc.) | discussion |
| [R3-251621](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251621.zip) | BL draft CR to TS 38.300 on Support of WAB (Qualcomm, Ericsson, CATT, ZTE, Nokia, Nokia Shanghai Bell) | draftCR |
| [R3-251637](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251637.zip) | (TP to BLCR for TS 38.401) On support of WAB (CATT) | other |
| [R3-251638](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251638.zip) | (TP to BLCR for TS 38.423) On resource coordination and Xn management for WAB (CATT) | other |
| [R3-251694](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251694.zip) | (TP to BL CR of 38.423 on WAB) Discussion on access and reliability for WAB (NEC) | other |
| [R3-251727](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251727.zip) | (TP to BL CR for TS 38.401) Discussion on NG management and Xn management for WAB (Nokia, Nokia Shanghai Bell) | other |
| [R3-251728](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251728.zip) | (TP for TS 38.423) Enhancement for WAB (Nokia, Nokia Shanghai Bell) | other |
| [R3-251842](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251842.zip) | (TP to BLCR for TS 38.410) Discussion on WAB mobility (Samsung) | discussion |
| [R3-251843](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251843.zip) | Discussion on other aspects for the support of WAB (Samsung) | discussion |
| [R3-251850](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251850.zip) | (TPs for WAB BL CRs) Architecture, Access Control and Additional ULI for WAB (Huawei) | other |
| [R3-251851](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251851.zip) | (TP for WAB BL CR for TS 38.401) Radio Resource multiplexing coordination for WAB-node (Huawei) | other |
| [R3-251942](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251942.zip) | (TP to BL CR 38.401) Architecture and configuration for WAB-node (Lenovo) | other |
| [R3-251943](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251943.zip) | (TP to BL CR 38.423) WAB-node co-location discovery (Lenovo) | other |
| [R3-251960](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251960.zip) | Discussion on enhancements for WAB (CANON Research Centre France) | discussion |
| [R3-252100](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252100.zip) | Further consideration on support of WAB (LG Electronics) | discussion |
| [R3-252101](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252101.zip) | (TP to TS 38.401, 38.413 and 38.423) TP for WAB support (LG Electronics) | other |
| [R3-252134](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252134.zip) | On Multi-hop Prevention and Functionalities for WAB (China Telecom) | discussion |
| [R3-252135](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252135.zip) | On RAN2 Impact of WAB (China Telecom) | discussion |
| [R3-252224](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252224.zip) | (TP to 38.401) Discussion on multi hop prevention and additional ULI for WAB (ZTE Corporation) | other |
| [R3-252225](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252225.zip) | (TP to TS 36.300) Discussion on supporting WAB (ZTE Corporation) | other |
| [R3-252251](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252251.zip) | Discussion on Wireless Access Backhaul (NTTDOCOMO, INC.) | discussion |
| [R3-252106](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252106.zip) | Discussion on Wireless Access Backhaul (NTTDOCOMO, INC.) | Discussionwithdrawn |
| **12.3. 5G Femto** **QUOTA: 2***The objectives of the 5G Femto work are as follows:* * *Specification to support NR Femto architecture with optional NR Femto GW for NG interface [RAN3].*
* *Specification to support access control for NR Femtos operating in open, hybrid and closed modes reusing existing CAG functionality [RAN3].*

*NOTE 10: For NR Femto access control, only stage 2 impact is expected on this objective.**NOTE 11: Coordination with other WGs (e.g. SA2, SA3) when needed.**For NR Femto, the NG-C interface is defined as the interface:**- Between the NR Femto GW and the Core Network;**- Between the NR Femto and the NR Femto GW;**- Between the NR Femto and the Core Network;**An NR Femto may serve more than one cell.**NG-U is defined as specified in clause 4.3.1.1 regardless of whether it is concentrated in the NR Femto GW.* *In case of user plane transport concentration at the Femto GW, the Femto GW takes the role described in Option 3 (routing at the IP).* *TS 38.300 captures reference to the specification section describing NG control plane stack for NR Femto without NR Femto GW.**In cases of NR Femto connecting to a NR Femto GW, the NR Femto shall only connect to a single NR Femto GW at any point in time.**The NR Femto GW supports NG-Flex configuration and can simultaneously connect to multiple AMFs.**Referencing existing definitions and specification is sufficient for access control with CAG – all functionality is already specified.**The text in Sec. 5.3 of TR 38.799 should be adopted as a NOTE; there is no need to explicitly mention “open”, “closed”, and “hybrid” access mode in such NOTE and no need has been currently identified to introduce such definitions.**RAN3#127:**Send an LS to SA3 to check verification aspects with respect to NR Femto GW architecture.**Considering that NAT is an IP router functionality, and that IP routers are part of the transport network, NAT does not need to be mentioned in the stage 2 description of the NR Femto GW; the FFS below is thus resolved.**To avoid routing ambiguities, a TAI used in a NR Femto GW shall not be reused in another NR Femto GW.**Reuse the Global gNB ID to identify the NR femto node.* *The Femto GW hosts the following function?** *Selection of an IP version to be used for NG-U, if a NG-U UP transport layer information configuration contains two transport layer addresses of different versions*

*Check the open issue above…* |
| [R3-251524](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251524.zip) | LS on NR Femto node shared by PLMN and PNI-NPN (SA2(LGE)) | LS in |
| [R3-251622](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251622.zip) | (TP to draft BL CR to TS 38.300) Discussion on NR Femto node shared by PLMN and PNI-NPN (Qualcomm Inc.) | other |
| [R3-251639](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251639.zip) | Discussion on remain issue of NR Femto (CATT) | discussion |
| [R3-251640](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251640.zip) | (TP to BLCR for TS 38.300) Introduction of Functional Split for NR Femto (CATT) | other |
| [R3-251682](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251682.zip) | Mobility for NR Femto (NEC) | discussion |
| [R3-251702](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251702.zip) | (TP to TS 38.300) Discussion on function split for NR Femto (ZTE Corporation) | other |
| [R3-251703](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251703.zip) | Discussion on access control for NR Femto (ZTE Corporation) | other |
| [R3-251786](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251786.zip) | Discussion on Slice Feature and Access Control for NR Femto (Baicells Technologies Co. Ltd) | discussion |
| [R3-251789](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251789.zip) | TP to BL CR for TS 38.300 and TS 38.413 on NR Femto (Baicells Technologies Co. Ltd) | other |
| [R3-251844](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251844.zip) | (TP to TS 38.300) Discussion on functional split for NR Femto (Samsung) | discussion |
| [R3-251845](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251845.zip) | (draft Reply LS to SA2) Discussion on LS from SA2 for NR Femto (Samsung) | discussion |
| [R3-251852](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251852.zip) | (TP for Femto BL CR for TS 38.300/38.413) Discussion on functional split and remaining issues for NR Femto (Huawei) | other |
| [R3-251853](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251853.zip) | (TP for Femto BL CR for TS 38.300) Discussion on SA2's LS on NR Femto node shared by PLMN and PNI-NPN (Huawei) | other |
| [R3-251861](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251861.zip) | On remaining issues for NR Femto (China Telecom) | discussion |
| [R3-251900](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251900.zip) | IP Version Selection when the NR Femto GW Is Deployed (Ericsson LM) | other |
| [R3-251901](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251901.zip) | Sharing between PLMN and PNI-NPN (Ericsson LM) | discussion |
| [R3-251944](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251944.zip) | Discussion on remaining issues for NR Femto (Lenovo) | discussion |
| [R3-251945](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251945.zip) | (TP to BL CR 38.300) Architecture and function split for NR Femto (Lenovo) | other |
| [R3-252012](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252012.zip) | Completion of Functional Aspects of NR Femto (Nokia, BT) | discussion |
| [R3-252013](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252013.zip) | Reply LS on NR Femto Node shared by PLMN and PNI NPN (Nokia ) | LS out To: SA2 CC:  |
| [R3-252102](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252102.zip) | (TP to TS 38.300) Further discussion on access control in 5G Femto (LG Electronics) | other |
| [R3-252103](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252103.zip) | [Draft] Reply LS on NR Femto node shared by PLMN and PNI-NPN (LG Electronics) | LS out To: SA2 CC: RAN2 |
| [R3-252252](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252252.zip) | Discussion on 5G femto (NTTDOCOMO, INC.) | discussion |
| [R3-252107](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252107.zip) | Discussion on 5G femto (NTTDOCOMO, INC.) | Discussionwithdrawn |