3GPP TSG-RAN WG3 #128 R3-253760

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Agenda Item: 12.2

Source: NTTDOCOMO (moderator)

Title: Summary of Offline Discussion on additional topological enhancement

Document for: Approval

# Rapporteur’s suggestions for on-line meeting discussion

## WAB

### Topic priority

**Proposal1: RAN3 to discuss the topics in the following priority in this meeting.**

* 1st priority topic: resource coordination
* 2nd priority topic: Xn connection management
* 3rd priority topic: Multi-hop prevention

### WAB resource coordination

**Proposal2: For WAB resource coordination, RAN3 to discuss the following principles**

* Option1(R3-253132):

Proposal 1: Adopt the following principles for WAB resource coordination:

* Only time-domain resource coordination is supported.
* Neither the WAB-gNB nor the BH-gNB has the upper hand in resource coordination.
* No support for indication of soft resources (the “S” in HSNA).
* Only the WAB-gNB should be able to indicate the hard/not available resource allocation.
* Option2(R3-253169):

– Reuse IAB ASN.1 (i.e. reuse IEs and procedures introduced for IAB feature for WAB). FFS on the exceptions.

– Support both F1 and Xn for resource coordination. Otherwise, no resource coordination feature to be supported.

* Option3(R3-253345):
* Introduce WAB specific procedure for resource multiplexing in XnAP, as agreed in previous meeting, try to reuse the IEs introduced for IAB features as much as possible.
* Option 4 (R3-253537):

- Support both F1 and Xn for resource coordination, introduce WAB specific procedures in XnAP and F1AP. All resource multiplexing features introduced for IAB are applied to WAB unless not applicable.

### Xn management

**Proposal3: For Xn management, RAN3 to discuss the following proposals (R3-253132):**

Proposal 2-1: The “WAB-MT ID” sent from the WAB-gNB to the BH-gNB is the WAB-MT’s C-RNTI assigned by the BH-gNB. (R3-253132)

Proposal 2-2: The WAB-gNB sends to the BH-gNB the ID of the BH-gNB’s cell serving the WAB-MT. (R3-253132)

Proposal 2-3: Xn connection between WAB-gNBs can be established. (R3-253132)

Proposal 2-4: The WAB-gNB should be notified about the target BH-gNB before the WAB-MT HO. (R3-253132)

Proposal 1: The BH-gNB can provide the TNL information of neighbour gNBs to the WAB node. (R3-253344)

Proposal 2-5: The WAB-gNB should be aware of whether the BH link for the WAB-MT is a terrestrial or a non-terrestrial one. (R3-253132)

Proposal 6: If the backhaul is NTN link, the WAB-gNB informs UE’s CN that the BH link RAT type is NTN. （R3-253344）

### Multi-hop prevention

**Proposal4: For multi hop prevention, to discuss the following proposal (R3-253414):**

Proposal 1: RAN3 to confirm supporting Solution 3, and send a LS to RAN2 to start the spec work on supporting the spec-based solution.

Proposal 2: RAN3 assumes that supporting cell barring based on the new indicator in SIB is an optional capability for WAB-MT, which means:

* WAB-MTs with Rel-19 UE capability can read the new indicator in SIB to avoid to access WAB node
* WAB-MTs without this UE capability (e.g., with only Rel-15~Rel-18 UE capabilities) can avoid multi-hop based on implementation

Proposal 3: No further discussion on WAB multihop topology prevention in Rel-19.( R3-253131)

(if time allowed):

### Additional ULI (if time allows)

**Proposal5: For AULI, to discuss the following proposal:**

Proposal 1: Keep the *Additional ULI* IE in NGAP UE-associated messages.

Proposal 10: RAN3 to coordinate with SA2 to check whether the additional ULI shall be removed from UE’s user location information.

Proposal 2-1: Remove the *additional ULI* IE in NG UE associated messages from BL CR to TS 38.413.

Proposal 3: The Additional ULI shall include the NID if the WAB-MT is accessing to a SNPN network.

### NG management (if time allows)

**Proposal6: For NG management, to discuss the following proposal:**

Proposal 1-1: No cause value is provided for NG Removal.

Proposal 1-2: The AULI in NG SETUP REQUEST message can be used to inform AMF that peer NG-RAN node is a WAB-gNB.

Proposal 7: The motivation for adding WAB-gNB indication in during NG Setup procedure needs to be further clarified. If the motivation is justified, the additional ULI in the NG SETUP REQUEST message can be used as such WAB-gNB indication.

Proposal 4: RAN3 to discuss if and how to introduce the NG suspend/resume procedure for WAB node, and the NTN related discussion and conclusion can be taken as a reference.

## 5G Femto

### Security aspects

**Proposal 1: RAN3 to discuss and capture the security verifications confirmed by SA3 in the NR Femto BL CR 38.300 as per the TP presented in annex A. (R3-253224)**

4.X.2.2 NR Femto GW

The NR Femto GW hosts the following functions:

- Relaying UE-associated NGAP messages between the AMF and the NR Femto serving the UE, applying the following additional functions:

- Terminating the UE Context Release request procedure if an explicit GW Context Release Indication is included. In this case, the NR Femto GW releases the UE context if it determines that the UE identified by the received UE NGAP IDs is no longer served by another NR Femto attached to it.

- At UE context establishment (Initial Context Setup or NG Handover) the NR Femto GW sends to the NR Femto the serving AMF’s GUAMI as well as the AMF UE NGAP ID assigned by the AMF and the AMF UE NGAP ID assigned by the NR Femto GW for the UE.

- At Path Switch, the NR Femto GW sends to the NR Femto the AMF UE NGAP ID assigned by the AMF and the AMF UE NGAP ID assigned by the NR Femto GW for the UE.

- At Initial connection establishment (Initial UE Message, NG Handover, Path Switch) the NR Femto GW verifies, as defined in TS 33.545 [xx], that the reported CAG ID is valid for the indicated NR Femto cell.

- Terminating non-UE associated NGAP procedures towards the NR Femto and towards the AMF, applying the following additional functions:

- At NG Setup, the NR Femto GW verifies, as defined in TS 33.545 [xx], that the identity used by the NR Femto is valid.

- In case of NG PWS Restart Indication and PWS Failure Indication, the NR Femto GW verifies, as defined in TS 33.545 [xx], that the indicated cell identity is valid and replaces the gNB ID of the NR Femto with the NR Femto GW ID before sending the respective message to the AMF.

- At Overload Start/Stop, the NR Femto GW should provide the NR Femto with the identities of the affected AMF node(s). The NR Femto uses the received information to identify the traffic and the AMF to which the overload indication applies. The NR Femto shall apply the defined rejections until reception of an OVERLOAD STOP message applicable to this traffic, or until the NR Femto receives a further OVERLOAD START message applicable to the same traffic, in which case it shall replace the ongoing overload action with the newly requested one.

- Supporting TAC and PLMN ID used by the NR Femto.

- Relaying the PATH SWITCH REQUEST message towards the AMF indicated by the GUAMI of the source AMF received from the NR Femto.

4.X.2.3 AMF

In addition to functions specified in clauses 4.1 and 16.7, the AMF hosts the following functions:

- Routing of handover messages and Downlink RAN Configuration Transfer message towards NR Femto GWs based on the Selected TAI contained in these messages.

- In case of an NR Femto directly connected to AMF:

- At NG Setup, verifying, as defined in TS 33.545 [xx], that the identity used by the NR Femto is valid;

- At Initial connection establishment (Initial UE Message, NG Handover, Path Switch), verifying, as defined in TS 33.545 [xx], that the reported CAG ID is valid for the indicated NR Femto cell;

- At NG PWS Restart Indication and PWS Failure Indication, verifying, as defined in TS 33.545 [xx], that the indicated cell identity is valid.

A TAI used in a NR Femto GW shall not be reused in another NR Femto GW.

**Proposal 2: RAN3 to discuss the following proposal.(** **R3-253225)**

send a specific Femto indication in the Initial UE message of TS 38.413 from NR Femto to enable control of sending *Allowed PNI NPN List* or not.

**Proposal 3: RAN3 to discuss the following proposal.(** **R3-253566)**

**Discuss, revise and agree, if possible, the draft Reply LS in Annex.**

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**1. Overall Description:**

RAN3 thanks SA3 for their LS on security verification related to NR Femtos.

RAN noticed SA3’s assumption of CAG ID verification being located at the NR Femto GW, if deployed. According to PNI-NPN functionality specified in Rel-16, such verification is always performed at the AMF and RAN3 does not foresee to change this functional split.

RAN3 also noticed that the normative text agreed by SA3 in S3-251699 refers to “Femtos operating in closed access mode” (2 instances), and would like to point out the following:

* NR Femtos reuse already specified PNI-NPN functionality (Secs. 4.6, 4.8 and 16.7.4 of TS 38.300), without modification. RAN3 agreed not to introduce new definitions for access control in NR Femtos in normative text; hence, no definition of “closed access mode” is expected to be added to TS 38.300.
* Furthermore, an NR Femto may have more than one cell.

For this reason, RAN3 suggests to SA3 to consider amending the agreed text in S3-251699 (e.g. changing “Femtos operating in closed access mode” to e.g. “Femtos with NPN-only cell(s)” seems better aligned toward Stage 2 text endorsed by RAN3 (see Sec. 4.x.4 of R3-253076, endorsed BL CR to TS 38.300).

**2. Actions:**

**To SA3 group.**

**ACTION:** RAN3 asks SA3 group to take the above into account, and to consider amending their agreed text according to the above.

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**Proposal 4: RAN3 to discuss the following proposal.(** **R3-253304)**

**Proposal 3: The verification functions for NR Femto Gateway and AMF on receiving NGAP INITIAL UE MESSAGE message, NGAP SETUP REQUEST message, NGAP PWS RESTART INDICATION message and NGAP PWS FAILURE INDICATION message should be captured in BL CR to TS 38.300.**

### Naming of 5G Femto

**Proposal5: RAN3 to discuss the following two options regarding naming of 5G Femto.**

Option1: use the terms “NR Femto node” and “NR Femto cell” to designate respectively the node and the cell. (R3-253225)

Option2: RAN3 to replace the term “NR Femto Node” with “NR Femto” in the BL CR to TS 38.300. (R3-253346)

### IP version selection

**Proposal 6: RAN3 to discuss the following proposal for IP version selection.**

**Option1: avoid the IP version selection for UP at NR femto GW. (R3-253346)**

Option2: When NR Femto GW is deployed, the Femto GW may perform IP version selection for NG-U transport by implementation. No stage 3 impact. (R3-253741)

### Slicing information to NR Femto node

**Proposal 7: RAN3 to discuss the following proposal.(** **R3-253225)**

clarify the (non)usage of the list of slices when received by the NR Femto connected to GW in TS 38.413.

### Mobility issue

**Proposal 8: RAN3 to discuss the following proposal.(R3-253225)**

Enhance TS 38.413 to inform gNB of CAG time validity before it expires in order to enable handovers before CAG expiry.

**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. （R3-253346）**

### Naming of Requested S-NSSAI IE

**Proposal 9: RAN3 to discuss the following proposal. (R3-253346)**

RAN3 to replace the term “requested S-NSSAI” with “requested S-NSSAI list” in the BL CR to TS 38.413.

### Access control

**Proposal 10: RAN3 to discuss the following proposal.(** **R3-253575)**

use the terminologies “a NR Femto activating an CAG-only cell” instead of “a closed NR Femto” in the corresponding TP.

# Introduction

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

# Discussion

## WAB

### Additional ULI

**Proposal 1: Keep the *Additional ULI* IE in NGAP UE-associated messages.**

**Proposal 10: RAN3 to coordinate with SA2 to check whether the additional ULI shall be removed from UE’s user location information.**

**Proposal 2-1: Remove the *additional ULI* IE in NG UE associated messages from BL CR to TS 38.413.**

There is no need for the WAB-gNB to report the AULI via the UE-associated procedure. So we propose to remove it from Stage-2/3 TP.

**Proposal 4-1: For TS 38.401 BL CR, update the text related to providing AULI via UE-associated procedures.**

**Proposal 4-2: For TS 38.413 BL CR, Remove AULI from the *User Location Information* IE.**

**TP for TS 38.401 BL CR can be found in ([3])**

**TP for TS 38.413 BL CR can be found in Annex A – Text proposal for TS 38.413**

**Proposal 2: Keep the Additional ULI in the *User Location Information*****IE as it is.**

**Proposal 3: The Additional ULI shall include the NID if the WAB-MT is accessing to a SNPN network. Agree the TP in Annex A.**

**Proposal 4: It is suggested to capture following description in stage2 specification:**

The mapping between Additional ULI and WAB-node’s geo-location is configured in the WAB node and the core network. The mapping may be pre-configured (e.g., up to operator's policy or OAM) or up to implementation.

### Multi-hop prevention

**Proposal 1: RAN3 to confirm supporting Solution 3, and send a LS to RAN2 to start the spec work on supporting the spec-based solution.**

**Proposal 2: RAN3 assumes that supporting cell barring based on the new indicator in SIB is an optional capability for WAB-MT, which means:**

* **WAB-MTs with Rel-19 UE capability can read the new indicator in SIB to avoid to access WAB node**
* **WAB-MTs without this UE capability (e.g., with only Rel-15~Rel-18 UE capabilities) can avoid multi-hop based on implementation**

**Proposal 1-2: RAN3 send LS to RAN2 to trigger the specification on supporting solution 3 and potentially other WAB-MT’s capabilities.**

**Proposal 3: No further discussion on WAB multihop topology prevention in Rel-19.**

**Observation 1-1: Solution 1 provides a mechanism to avoid multi-hop topologies during WAB-node access.**

**Observation 1-2: For out-of-band operation, WAB-MT will always identify BH RAN cells based on frequency band, i.e., apply solution 1.**

**Observation 1-3: For in-band operation, the WAB-MT needs to connect to a cell that supports resource coordination, which automatically preclude WAB-gNBs, and which cannot be indicated by Solution 3.**

**Observation 1-4: Solution 3 is therefore useless.**

**Proposal 1: RAN3 to discontinue discussion on Solution 3 for multi-hop prevention since (1) it is suboptimal for out-of-band operation and (2) insufficient for in-band operation as it does not indicate the BH gNBs that provide resource coordination.**

**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, and send LS to RAN2 for coordination.**

### Xn connection management

**Proposal 2-1: The “WAB-MT ID” sent from the WAB-gNB to the BH-gNB is the WAB-MT’s C-RNTI assigned by the BH-gNB.**

**Proposal 2-2: The WAB-gNB sends to the BH-gNB the ID of the BH-gNB’s cell serving the WAB-MT.**

**Proposal 2-3: Xn connection between WAB-gNBs can be established.**

**Proposal 2-4: The WAB-gNB should be notified about the target BH-gNB before the WAB-MT HO.**

**Proposal 2-5: The WAB-gNB should be aware of whether the BH link for the WAB-MT is a terrestrial or a non-terrestrial one.**

**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.**

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

**Proposal 2-1: WAB-gNB can recognize BH-RAN-node through co-located WAB-MT reading SIB1 of the serving cell.**

**Proposal 2-2: WAB-gNB obtains IP address of the BH-RAN-node via legacy Xn-C TNL address discovery mechanism to set up Xn connection with the BH-RAN node.**

**Proposal 2-3: If WAB-gNB establishes Xn connection with BH-RAN-node, it discovers neighbour cells through Xn messages sent from the BH-RAN-node.**

**Proposal 2-4: WAB-gNB looks up the IP address(es) of the neighbour nodes using legacy Xn-C TNL address discovery mechanism to set up Xn connections with those RAN nodes.**

**Proposal 2-5: WAB-gNB considers the cell not included in the serving/neighbour cell information of current BH-RAN-node as no longer being the neighbour cell.**

**Proposal 2-6: WAB-gNB removes Xn with the NG-RAN nodes which do not serve any neighbour cell of the WAB-gNB.**

**Observation 1: The OAM system may not be able to configure the TNL addresses of neighbour gNBs in time and it would bring huge burden to operators.**

**Observation 2: It takes a long time for the WAB-gNB to obtain its neighbour gNB’s TNL address via the Xn-C TNL address discovery procedure.**

**Proposal 7: The BH-gNB which has WAB specific enhancement sends TNL address of neighbour gNBs which has already established Xn connection with the BH-gNB to the WAB-gNB to enable dynamic Xn setup.**

**Proposal 8: 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.**

**Proposal 1: The BH-gNB can provide the TNL information of neighbour gNBs to the WAB node.**

**Proposal 2: A WAB-node can reject the Xn Setup Request from another WAB-node, if the XN SETUP REQUEST message contains the** **WAB-MT Identifier.**

**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 2-5: RAN3 discuss the enhancement to avoid the UE context retrieval problems when Xn is removed between a WAB-gNB and a surrounding gNB.**

**Proposal 1: Some enhancements should be proposed to achieve TNL address of the neighbor nodes quickly, rather than reusing the current Xn-C TNL address discovery procedure.**

**Proposal 2-1: It is helpful for the WAB-gNB to establish Xn connection with the neighbor nodes quickly, if the BH gNB can inform the WAB-gNB of the TNL address of the neighbor nodes during Xn setup procedure.**

**Proposal 2-2: In order to reduce the latency of Xn establishment between the BH gNB and the WAB-gNB, the WAB-MT can send the TNL address of the collocated WAB-gNB to the BH gNB, and the BH gNB can initiate Xn setup procedure towards the WAB-gNB directly.**

### Resource coordination(1)

**Proposal 1: Adopt the following principles for WAB resource coordination:**

* **Only time-domain resource coordination is supported.**
* **Neither the WAB-gNB nor the BH-gNB has the upper hand in resource coordination.**
* **No support for indication of soft resources (the “S” in HSNA).**
* **Only the WAB-gNB should be able to indicate the hard/not available resource allocation.**

**Proposal 2: Design XnAP signalling for WAB resource coordination, containing the IEs marked in green and cyan.**

1. The WAB-gNB sends the multiplexing capabilities and the resource configuration information of its served cells to the BH-gNB via XnAP signalling, the content of the signalling can be same as the content in the *IAB Cell Information* IE except the *RACH Config Common IAB* IE.
2. The WAB-node get the resource configuration of BH-gNB’s cell using legacy signalling over backhaul Uu interface.
3. It is not recommended that the BH-gNB to configure the resource of the WAB-gNB cells.
4. The WAB-gNB can be informed of the neighbour nodes’ cell resource configuration. FFS on whether it is informed by the BH-gNB or the neighbour node itself.
5. RAN3 to agree sending LS to RAN1 and RAN2 on the resource coordination for WAB.
6. For WAB-node mobility, the resource multiplexing coordination between target BH-gNB and the WAB-gNB can be conducted before the completion of WAB-MT’s handover.

**Proposal 1-1: Based on the above observations 1-1 to 1-3, RAN3 to only consider the following two options:**

* **Option 1: WAB to reuse IAB’s resource coordination by appropriately adjusting the terminology but without changes to procedures or ASN.1.**
* **Option 2: WAB to deprioritize resource coordination and therefore in-band operation.**

**Proposal 1-2: WAB resource coordination to be supported for BH split architecture or to not be supported at all.**

**Observation 1: CU-DU split architecture could be used at BH-gNB.**

**Proposal 8: If the BH gNB uses CU-DU split architecture, similar F1 signaling designed for IAB resource multiplexing is adopted between the BH-gNB-CU and BH-gNB-DU for WAB. A new class 1 F1 procedure is introduced for WAB for the signaling between BH-gNB-CU and BH-gNB-DU.**

**Proposal 9: The BH-gNB-CU configures semi-static cell resource configuraiton for a BH-gNB-DU via the new Xn signalling.**

**Proposal 10: BH-gNB-DU sends its WAB STC configuration to BH-gNB-CU if configured by OAM via Served Cell Information IE in F1AP message.**

**Proposal 11: BH-gNB-CU can reconfigure WAB STC configuration for the BH-gNB-DU via F1 signaling if needed.**

**Proposal 12: BH-gNB-CU sends child node information of WAB-node to BH-gNB-DU via F1AP signaling, which includes cell resource configuration, cell specific signaling/channel configuration and multiplexing info of WAB-node.**

**Proposal 13: BH-gNB-CU sends cell resource configuration of neighbouring WAB-nodes/BH-gNB-DU to BH-gNB-DU via F1AP signaling.**

**Proposal 14: BH-gNB-CU sends the per-child MT link-NA resource configuration to the BH-gNB-DU via F1 signaling to inform the NA resource configuration of the BH-gNB-DU cell for the WAB-MT.**

**Proposal 15: RAN3 to agree the draft TP to TS 38.423 and TS 38.473 in Annex A and B separately.**

**Proposal 16: RAN3 to agree the draft LS to RAN1 and RAN2 on the resource coordination for WAB in Annex C.**

**Proposal 2-1: RAN3 assumes that IAB STC and RACH Config Common IAB are not needed for WAB. To be confirmed by RAN1/2.**

**Proposal 2-2: RAN3 to revoke the agreement “For WAB resource coordination, introduce a new class-1 Xn procedure between WAB-gNB and BH gNB” since it adds unnecessary specification and implementation overhead, and since the existing IAB resource coordination messages can be used instead.**

**Proposal 2-3: RAN3 to agree on TP to BL CR for TS 38.423 in ANNEX 1.**

**Proposal 3: RAN3 to agree on TP to BL CR for TS 38.473 in ANNEX 2.**

**Proposal 4-1: Before the WAB-MT connects to a RAN-node, its co-located WAB-gNB can establish Xn with this RAN-node and exchange resource coordination messages.**

**Proposal 4-2: For WAB-gNB/MT collocation discovery, the WAB-MT passed by the WAB-gNB to a RAN-node to include the WAB-MT’s serving cell’s C-RNTI and the servicing cell’s NR CGI.**

**Proposal 3-1: in TS 38.423, 9.2.2.95 gNB-DU Cell Resource Configuration, and 9.2.2.97 RB Set Configuration should be reused for WAB.**

**Proposal 3-2: Re-use F1AP gNB-DU Cell Resource Configuration IE for coordination between WAB-gNB and the BH-gNB. IAB Cell Information IE is not applicable for WAB.**

**Proposal 1: The BH-gNB configures semi-static cell resource configuraiton for a WAB-gNB via the new Xn signalling.**

**Proposal 2: Soft attribute is also supported for WAB, and WAB-node can determine the availability implicitly on its own.**

**Proposal 3: Whether it is supported that the BH-gNB configures the availability of soft resources of WAB-gNB can be left to RAN1/2 decision. An LS is sent to RAN1/2 to trigger the discussion in RAN1/2.**

**Proposal 4:WAB-gNB sends its cell specific signaling/channel configuration to BH-gNB via Xn. And BH-gNB regards the cell specific signaling/channel configuration of WAB-gNB as hard resources.**

**Proposal 5: WAB-gNB reports its multiplexing info in the *Served Cell Information NR* IE via XN SETUP REQUEST, NG-RAN NODE CONFIGURATION UPDATE and NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE messages.**

**Proposal 6: Cell resource configuraiton of WAB-gNB could be exchanged between WAB-gNB and BH-gNB via *Served Cell Information NR* IE in XnAP messages.**

**Proposal 7: BH-gNB could send the per-child MT link-NA resource configuration to the WAB-gNB via Xn to inform the NA resource configuration of the BH-gNB cell for the co-located WAB-MT.**

**Proposal 1-8: WAB-gNB resource configuration can be sent to the BH-gNB-DU including the equivalent content of “Resource configuration of child IAB-DU” in the existing GNB-DU RESOURCE CONFIGURATION message, except Child IAB-Nodes NA Resource and Parent IAB Nodes NA Resource Configuration IEs. It’s FFS whether the resource configuration of BH-gNB-DU can be reconfigured by BH-gNB-CU.**

**Proposal 1-9: A new F1 procedure should be introduced for BH-gNB-CU to send the resource configuration of WAB-gNB to BH-gNB-DU.**

### Resource coordination(2)

Proposal 3: OAM configures the inband/outband mode to WAB-node.

**Observation 1: To support the in-band WAB deployment, the BH-RAN must be upgraded to aware of WAB and can support the resource multiplexing.**

**Proposal 4: The BH-gNB should broadcast whether it supports resource multiplexing coordination for WAB.**

**Proposal 5: RAN3 to discuss the following two alternatives for the proper BH-gNB selection:**

* **Option 1: WAB-MT (re-)selects a proper BH-gNB** **based on the configuration from OAM and the knowledge about BH-gNB.**
* **Option 2: OAM configures the WAB-gNB considering the knowledge about BH-gNB.**

**Proposal 1-1: The new Class 1 XnAP procedure is non-UE associated.**

**Proposal 1-2: WAB-MT should optionally support the capability of decoding gNB ID in SIB1. RAN3 can send LS to RAN2 for specifying this capability of WAB-MT.**

**Proposal 2-1: RAN3 to discuss how the WAB-MT identifies a BH gNB that supports WAB-related resource coordination during cell (re)selection and/or initial access,.**

**Proposal 2-2: RAN3 to discuss how a BH gNB with support of WAB-related resource coordination knows whether neighbour nodes also support WAB-related resource coordination, so that it can perform appropriate WAB-MT handover.**

**Proposal 2-3: RAN3 to consider the following options:**

* **Option 1: WAB-nodes and WAB-enhanced BH gNBs are configured with BH gNB IDs that support WAB resource coordination.**
* **Option 2: BH gNBs indicate support for WAB-related resource coordination OTT.**
* **Option 3: BH gNBs exchange information about WAB-related resource coordination via Xn.**

**Proposal 2: In order to reduce interference duration between access and backhaul links, the WAB-gNB ID can be included in the HO request to enable the target BH gNB know the collocation of WAB-MT and WAB-gNB early.**

### WAB specific cause value

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

### NG interface management

**Proposal 1-1: No cause value is provided for NG Removal.**

**Proposal 1-2: The AULI in NG SETUP REQUEST message can be used to inform AMF that peer NG-RAN node is a WAB-gNB.**

**Proposal 7: The motivation for adding WAB-gNB indication in during NG Setup procedure needs to be further clarified. If the motivation is justified, the additional ULI in the NG SETUP REQUEST message can be used as such WAB-gNB indication.**

**Proposal 4: RAN3 to discuss if and how to introduce the NG suspend/resume procedure for WAB node, and the NTN related discussion and conclusion can be taken as a reference.**

### 3.1.8 DC for WAB-gNB

**Proposal 4: RAN3 to confirm that WAB can support UE dual connectivity.**

**Observation 3: A WAB-gNB can act as an MN or SN in Dual Connectivity case.**

**Proposal 1: Do not support DC for WAB-gNB.**

### 3.1.9 WAB-gNB authorization

**Proposal 8: Update TS 38.401 BL CR to remove the “SeGW” for MWAB-gNB authorization.**

### 3.1.10 WAB integration

**Proposal 3-1: In phase 2-1 of WAB-node integration procedure, WAB-gNB should be authorized by OAM before the OAM configuring proper parameters to it. And BLCR to TS 38.401 should be updated to capture that as Annex.**

**Proposal 3-2: A note should be added for WAB-node integration procedure in BLCR to TS 38.401 that the SeGW is out of RAN’s scope.**

### 3.1.11 WAB mobility

**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.**

**Proposal 4-2: no need to introduce enhancement to handle the handover Xn-U traffic during WAB node’s mobility.**

### 3.1.12 WAB architecture using a tunnel

**Proposal 6: RAN3 to capture that a tunnel may be used to transfer the WAB-gNB’s traffic in TS 38.401. Agree the TP in Annex C.**

### 3.1.13 WAB-MT mobility with BH-UPF change

**Proposal 9: Existing mechanism can be used for the direction of the Xn-U GTP tunnel, i.e. using the Xn S-NG-RAN NODE MODIFICATION procedure.**

**Proposal 10: No need to have signaling enhancement to achieve redirection of Xn-U GTP-U tunnels for HO case.**

### 3.1.14 PCI re-configuration for WAB

**Observation 3: It is possible that a WAB-gNB cell’s PCI may need to be changed when the WAB node moves to a new location.**

**Proposal 3: to support the change of the PCI used by a WAB-gNB’s cell, the WAB-gNB instantiates a new logical cell using a new PCI, new cell ID and old TAC. The WAB-gNB initiate the intra-gNB handover for the UEs connected with the old WAB-gNB cell to the new WAB-gNB cell. After all the UEs in RRC\_CONNECTED state are handed over, the old logical WAB-gNB cell is removed from service.**

**Stage-2 TP can be found in Annex – TP to BL CR for TS 38.401**

### 3.1.15 WAB-gNB mobility with change of UE’s AMF(s)

**Proposal 5: update Stage-2 TP to use “shall” and delete the EN in below Stage-2 BL CR:**

For the AMF change, a new logical WAB-gNB is instantiated, which establishes NG connection(s) towards one or more new AMF(s). The new logical WAB-gNB may obtain from the OAM the configuration parameters needed to establish the connection(s) to the UE’s new AMF(s), based on, e.g., WAB-node’s location.

The new logical WAB-gNB shall activate one or more cell(s) with new TAC, cell ID, and PCI, which depend on the WAB-node’s current location.

**Stage-2 TP can be found in Annex – TP to BL CR for TS 38.401**

### 3.1.16 Whether to support of ng-eNB as BH RAN node

**Proposal 7: Update TS 38.401 BL CR to use “BH-gNB” to replace “BH-RAN-node”**

**TP can be found in Annex – TP to BL CR for TS 38.401**

**Proposal 1: RAN3 decides whether the BH-RAN node could be an ng-eNB, i.e. where ng-eNB serves WAB-MT,**

**- Option 1: If RAN3 decides an ng-eNB could act as the BH-RAN node, an LS is needed to send to SA2 so that SA2 would update the specification accordingly. And it needs to be captured in TS 36.300 that WAB also applies for EUTRA connected to 5GC where ng-eNB is considered as the BH-RAN node.**

**- Option 2: If RAN3 decides an ng-eNB could not act as the BH-RAN node, the definition of BH-RAN node needs to be removed from TS 38.401, and the term“BH-RAN node” needs to replaced with “BH-gNB”.**

## 5G Femto

## 3.2.1 security aspects

**Proposal 1**: capture the security verifications confirmed by SA3 in the NR Femto BL CR 38.300 as per the TP presented in annex A.

4.X.2.2 NR Femto GW

The NR Femto GW hosts the following functions:

- Relaying UE-associated NGAP messages between the AMF and the NR Femto serving the UE, applying the following additional functions:

- Terminating the UE Context Release request procedure if an explicit GW Context Release Indication is included. In this case, the NR Femto GW releases the UE context if it determines that the UE identified by the received UE NGAP IDs is no longer served by another NR Femto attached to it.

- At UE context establishment (Initial Context Setup or NG Handover) the NR Femto GW sends to the NR Femto the serving AMF’s GUAMI as well as the AMF UE NGAP ID assigned by the AMF and the AMF UE NGAP ID assigned by the NR Femto GW for the UE.

- At Path Switch, the NR Femto GW sends to the NR Femto the AMF UE NGAP ID assigned by the AMF and the AMF UE NGAP ID assigned by the NR Femto GW for the UE.

- At Initial connection establishment (Initial UE Message, NG Handover, Path Switch) the NR Femto GW verifies, as defined in TS 33.545 [xx], that the reported CAG ID is valid for the indicated NR Femto cell.

- Terminating non-UE associated NGAP procedures towards the NR Femto and towards the AMF, applying the following additional functions:

- At NG Setup, the NR Femto GW verifies, as defined in TS 33.545 [xx], that the identity used by the NR Femto is valid.

- In case of NG PWS Restart Indication and PWS Failure Indication, the NR Femto GW verifies, as defined in TS 33.545 [xx], that the indicated cell identity is valid and replaces the gNB ID of the NR Femto with the NR Femto GW ID before sending the respective message to the AMF.

- At Overload Start/Stop, the NR Femto GW should provide the NR Femto with the identities of the affected AMF node(s). The NR Femto uses the received information to identify the traffic and the AMF to which the overload indication applies. The NR Femto shall apply the defined rejections until reception of an OVERLOAD STOP message applicable to this traffic, or until the NR Femto receives a further OVERLOAD START message applicable to the same traffic, in which case it shall replace the ongoing overload action with the newly requested one.

- Supporting TAC and PLMN ID used by the NR Femto.

- Relaying the PATH SWITCH REQUEST message towards the AMF indicated by the GUAMI of the source AMF received from the NR Femto.

4.X.2.3 AMF

In addition to functions specified in clauses 4.1 and 16.7, the AMF hosts the following functions:

- Routing of handover messages and Downlink RAN Configuration Transfer message towards NR Femto GWs based on the Selected TAI contained in these messages.

- In case of an NR Femto directly connected to AMF:

- At NG Setup, verifying, as defined in TS 33.545 [xx], that the identity used by the NR Femto is valid;

- At Initial connection establishment (Initial UE Message, NG Handover, Path Switch), verifying, as defined in TS 33.545 [xx], that the reported CAG ID is valid for the indicated NR Femto cell;

- At NG PWS Restart Indication and PWS Failure Indication, verifying, as defined in TS 33.545 [xx], that the indicated cell identity is valid.

A TAI used in a NR Femto GW shall not be reused in another NR Femto GW.

**Proposal 4**: send a specific Femto indication in the Initial UE message of TS 38.413 from NR Femto to enable control of sending *Allowed PNI NPN List* or not.

**Proposal 1: Discuss, revise and agree, if possible, the draft Reply LS in Annex.**

**1. Overall Description:**

RAN3 thanks SA3 for their LS on security verification related to NR Femtos.

RAN noticed SA3’s assumption of CAG ID verification being located at the NR Femto GW, if deployed. According to PNI-NPN functionality specified in Rel-16, such verification is always performed at the AMF and RAN3 does not foresee to change this functional split.

RAN3 also noticed that the normative text agreed by SA3 in S3-251699 refers to “Femtos operating in closed access mode” (2 instances), and would like to point out the following:

* NR Femtos reuse already specified PNI-NPN functionality (Secs. 4.6, 4.8 and 16.7.4 of TS 38.300), without modification. RAN3 agreed not to introduce new definitions for access control in NR Femtos in normative text; hence, no definition of “closed access mode” is expected to be added to TS 38.300.
* Furthermore, an NR Femto may have more than one cell.

For this reason, RAN3 suggests to SA3 to consider amending the agreed text in S3-251699 (e.g. changing “Femtos operating in closed access mode” to e.g. “Femtos with NPN-only cell(s)” seems better aligned toward Stage 2 text endorsed by RAN3 (see Sec. 4.x.4 of R3-253076, endorsed BL CR to TS 38.300).

**2. Actions:**

**To SA3 group.**

**ACTION:** RAN3 asks SA3 group to take the above into account, and to consider amending their agreed text according to the above.

## 3.2.2 Issue of NG mobility impact

**Observation 1: For traditional NG-based HO, the target AMF sends the HANDOVER REQUEST message to the target gNB, including the target cell ID (NCGI) in the** ***Source to Target Transparent Container*.**

**Observation 2: For the NG-based HO to a target NR Femto node, the target NR Femto GW is not able to determine the target Femto node, because the existing HANDOVER REQUEST message contains no suitable ID to identify the target Femto node.**

**Observation 3: Even if the NR Femto GW can read the Target Cell ID in the *Source to Target Transparent Container*, the target NCGI cannot be used to uniquely identify a NR Femto node, considering the gNB ID length is variable.**

**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.**

## 3.2.2 Others

**Proposal 1**: use the terms “NR Femto node” and “NR Femto cell” to designate respectively the node and the cell.

**Proposal 4: RAN3 to replace the term “NR Femto Node” with “NR Femto” in the BL CR to TS 38.300.**

**Proposal 2**: clarify the (non)usage of the list of slices when received by the NR Femto connected to GW in TS 38.413.

**Proposal 3**: enhance TS 38.413 to inform gNB of CAG time validity before it expires in order to enable handovers before CAG expiry.

**Proposal 2: RAN3 to avoid the IP version selection for UP at NR femto GW.**

1. When NR Femto GW is deployed, the Femto GW may perform IP version selection for NG-U transport by implementation. No stage 3 impact.
2. Agree the TP that the Femto GW may perform IP version selection by implementation.

**Proposal 3: RAN3 to replace the term “requested S-NSSAI” with “requested S-NSSAI list” in the BL CR to TS 38.413.**

**Proposal 3: The verification functions for NR Femto Gateway and AMF on receiving NGAP INITIAL UE MESSAGE message, NGAP SETUP REQUEST message, NGAP PWS RESTART INDICATION message and NGAP PWS FAILURE INDICATION message should be captured in BL CR to TS 38.300.**

**Proposal 2: It is proposed to use the terminologies “a NR Femto activating an CAG-only cell” instead of “a closed NR Femto” in the corresponding TP.**

# References

|  |
| --- |
| **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)] |
| 12.1. General*Time plan, skeletons* |
| [R3-253076](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253076.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 |
| [R3-253077](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253077.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 |
| [R3-253078](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253078.zip) | (BL CR to 38.401 for WAB) Support for Wireless Access Backhaul (Ericsson, ZTE, Nokia, Nokia Shanghai Bell, Huawei, Samsung, Lenovo, Qualcomm, Jio Platforms) | CR0439r8, TS 38.401 v18.5.0, Rel-19, Cat. B |
| [R3-253079](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253079.zip) | (BL CR to 38.410 for Femto) Introduction of NR Femto in NGAP list of functions (ZTE Corporation, Nokia, Baicells) | CR0052r4, TS 38.410 v18.2.0, Rel-19, Cat. B |
| [R3-253080](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253080.zip) | (BL CR to TS 38.413 for Femto) Support of NR Femto architecture with NR Femto Gateway (Nokia, Huawei) | CR1232r3, TS 38.413 v18.5.0, Rel-19, Cat. B |
| [R3-253081](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253081.zip) | (BL CR to 38.413 for WAB) Support for Wireless Access Backhaul (Huawei, Ericsson, Nokia, Nokia Shanghai Bell, China Telecom, ZTE, Qualcomm, Samsung, CATT, Jio Platforms (JPL), Lenovo) | CR1263r3, TS 38.413 v18.5.0, Rel-19, Cat. B |
| [R3-253082](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253082.zip) | (BL CR to 38.423 for WAB) Support for Wireless Access Backhaul (Nokia, Nokia Shanghai Bell, Ericsson, ZTE, LG Electronics, Qualcomm, Huawei, China Telecom, Samsung, Lenovo) | CR1487r1, TS 38.423 v18.5.0, Rel-19, Cat. B |
| [R3-253083](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253083.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)) | CR0189r2, 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.**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.**RAN3#127bis:**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 or for WAB node indication.* **It is understood that reception of the WAB-MT Identifier indicates that the sender is a WAB node. The receiver will behave accordingly.***When access and backhaul links of a WAB node are operated out-of-band, there is no need for WAB resource coordination.**RAN3 assumes that WAB deployments use out-of-band operation in case access and backhaul use different PLMNs.**In this release, In-band WAB operation is only considered for intra PLMN scenarios where BH gNB is upgraded with WAB-specific enhancements.**For WAB resource coordination, introduce a new class-1 Xn procedure between WAB-gNB and BH gNB. The message content 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 NB-DU RESOURCE CONFIGURATION procedure between BH gNB-CU and BH gNB-DU.**After RAN3 has finished specifying WAB resource coordination, RAN3 to send an LS to inform RAN1 and RAN2 about conclusions.**RAN3 to agree the WAB-gNB reports the additional ULI to the network within the NG Setup and RAN Configuration Update procedures.***Solution 1 is implementation specific and it is not subject to specifications changes.***There is no consensus in RAN3 on an agreement for solution 3 and make the decision in next meeting.**Continue to work on the open issues and details…*  |
| [R3-253013](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253013.zip) | Reply LS on FS\_VMR\_Ph2 solution impacts to RAN (Additional ULI) (SA2(Qualcomm)) | LS in |
| [R3-253018](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253018.zip) | Reply LS on MWAB-gNB Configurations (SA2(Qualcomm)) | LS in |
| [R3-253019](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253019.zip) | Reply LS on PWS enhancement for MWAB and MBSR (SA2(Ericsson)) | LS in |
| [R3-253131](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253131.zip) | (TP for WAB BL CR for TS 38.401): Functional Aspects of WAB-Nodes (Ericsson, Jio Platforms) | other |
| [R3-253132](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253132.zip) | WAB-Node Resource Coordination (Ericsson) | discussion |
| [R3-253168](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253168.zip) | Remaining aspects of WAB (Qualcomm Inc.) | discussion |
| [R3-253169](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253169.zip) | WAB radio resource coordination (Qualcomm Inc.) | discussion |
| [R3-253170](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253170.zip) | BL draft CR to TS 38.300 on Support of WAB (Qualcomm, Ericsson, CATT, ZTE, Nokia, Nokia Shanghai Bell) | draftCR |
| [R3-253175](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253175.zip) | Further consideration on support of WAB (LG Electronics) | discussion |
| [R3-253176](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253176.zip) | (TP to TS 38.401, 38.413 and 38.423) TP for WAB support (LG Electronics) | other |
| [R3-253211](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253211.zip) | (TP to BL CR of 38.423 on WAB) Discussion on access and reliability for WAB (NEC) | other |
| [R3-253223](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253223.zip) | Remaining aspects for the support of WAB (CANON Research Centre France) | discussion |
| [R3-253301](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253301.zip) | [Draft] LS on Multi-hop Topology Avoidance for WAB (CATT, China Telecom, Huawei, NTT Docomo, Lenovo, Samsung, NEC) | LS out To: RAN2 CC: SA2 |
| [R3-253302](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253302.zip) | (TP for BLCR to 38.401) On support of WAB (CATT) | other |
| [R3-253303](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253303.zip) | (TP for BLCRs to 38.423, 38.473) On resource coordination and Xn management for WAB (CATT) | other |
| [R3-253320](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253320.zip) | (TP to BL CR 38.423) Architecture and configuration for WAB-node (Lenovo) | other |
| [R3-253321](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253321.zip) | (TP to BL CR 38.423) Radio resource configuration for WAB-node (Lenovo) | other |
| [R3-253344](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253344.zip) | (TPs for WAB BL CRs) Architecture, Access Control and Additional ULI for WAB (Huawei) | other |
| [R3-253345](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253345.zip) | (TP for WAB BL CRs) Radio Resource multiplexing Coordination for WAB-node (Huawei) | other |
| [R3-253390](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253390.zip) | (TP to BL CR for TS 38.401) Discussion on NG/Xn management and other Stage-2 issues for WAB (Nokia, Nokia Shanghai Bell) | other |
| [R3-253391](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253391.zip) | (TP to BL CR for TS 38.413 and TS 38.423) Enhancement for WAB (Nokia, Nokia Shanghai Bell) | other |
| [R3-253404](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253404.zip) | (TP to 38.413, 38.401) Discussion on remaining issues for support of WAB (ZTE Corporation) | other |
| [R3-253412](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253412.zip) | Discussion on Wireless Access Backhaul (NTT DOCOMO INC.) | discussion |
| [R3-253414](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253414.zip) | Way Forward On Multi-hop Prevention for WAB (China Telecom, CATT, Huawei, DoCoMo, Lenovo, Samsung, NEC) | discussion |
| [R3-253415](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253415.zip) | RAN2 impact of WAB (China Telecom) | discussion |
| [R3-253537](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253537.zip) | (TP to 38.423 38.473) Supporting resource coordination in WAB (ZTE Corporation) | other |
| [R3-253635](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253635.zip) | (TP to BLCR for TS 38.410) Discussion on WAB mobility (Samsung) | discussion |
| [R3-253636](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253636.zip) | Discussion on the left issues for WAB (Samsung) | discussion |
| **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.**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.* *RAN3#127bis:**If the SMF sends both IP versions in the Transport Layer Address IE, the NR Femto node selects the correct IP version.**It is FFS how to harmonise terminology for “NR Femto”, “NR Femto Node”. Terminology shall be consistent.**It is FFS whether the GW can perform IP Version selection in addition to the NR Femto.* *Check the open issue above…* |
| [R3-253021](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253021.zip) | Reply LS on security verification related to NR Femtos (SA3(ZTE)) | LS in |
| [R3-253224](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253224.zip) | [TP for BL CR NR Femto 38.300] Completion of Security Aspects of NR Femto (Nokia, TMO US, BT, AT&T, NTT Docomo ) | other |
| [R3-253225](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253225.zip) | Completion of other open points of NR Femto (Nokia ) | discussion |
| [R3-253226](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253226.zip) | [TP for BL CR NR Femto TS 38.413] Completion of other open points of NR Femto (Nokia ) | other |
| [R3-253304](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253304.zip) | Discussion on remain issue of NR Femto (CATT) | discussion |
| [R3-253305](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253305.zip) | TP for BLCRs to 38.300, 38.410 for NR Femto (CATT) | other |
| [R3-253322](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253322.zip) | Discussion on remaining issues for NR Femto (Lenovo) | discussion |
| [R3-253323](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253323.zip) | (TP to BL CR 38.300) Function split for NR Femto (Lenovo) | other |
| [R3-253346](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253346.zip) | (TP for Femto BL CR for TS 38.300/38.413) Discussion on remaining issues for NR Femto (Huawei) | other |
| [R3-253347](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253347.zip) | (TP for Femto BL CR for TS 38.300) Security related issues for NR Femto (Huawei) | other |
| [R3-253364](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253364.zip) | On remaining issues for NR Femto (China Telecom) | discussion |
| [R3-253403](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253403.zip) | (TP to TS 38.300) On security verification related to NR Femtos based on the reply LS from SA3 (ZTE Corporation) | other |
| [R3-253413](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253413.zip) | Discussion on 5G femto (NTT DOCOMO INC.) | discussion |
| [R3-253450](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253450.zip) | Stage 2 Rapporteur Corrections for NR Femto (Ericsson) | other |
| [R3-253566](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253566.zip) | Aligning SA3 Text to RAN3 Agreements (Ericsson LM) | discussion |
| [R3-253575](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253575.zip) | Security verification related to NR Femtos (LG Electronics) | other |
| [R3-253576](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253576.zip) | (TP to TS 38.300) Support of security verification in NR Femto (LG Electronics) | other |
| [R3-253637](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253637.zip) | Discussion on the left issues for NR Femto (Samsung) | discussion |
| [R3-253638](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253638.zip) | (TP to BLCR for TS 38.300) Functional split for NR Femto (Samsung) | other |
| [R3-253741](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253741.zip) | (TP to TS 38.300) Discussion on IP version selection at Femto GW (ZTE Corporation) | other |
| [R3-253742](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253742.zip) | [draft] Reply LS on security verification related to NR Femtos (ZTE Corporation) | other |
| [R3-253451](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253451.zip) | Aligning SA3 Text to RAN3 Agreements (Ericsson) | Discussionwithdrawn |
| [R3-253565](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_128%5CDocs%5CR3-253565.zip) | Aligning SA3 Text to RAN3 Agreements (Ericsson) | Discussionwithdrawn |