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Agenda Item: 12.2

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Title: Summary of Offline Discussion on additional topological enhancement

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# Introduction

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

# Discussion

## WAB

### Multi-hop prevention

**For multi-hop prevention, RAN3 to down select to following three solutions:**

**Solution 1: The WAB-gNB uses dedicated frequencies and/or PCIs. FFS on any other legacy OTA parameters.**

**Solution 2: Use the slice dedicated for backhauling, i.e. use a list of S-NSSAIs in RRCsetupcomplete to do access control and/or use a list of S-NSSAIs in handover signalling. No CN upgrade is needed.**

**Solution 3: 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.**

**Solution5: In case of handover for a WAB-node, the new WAB-node indication is included in the HO request, then the target BH-RAN node can perform access control for this WAB-node.**

**Proposal 1: RAN3 to only support solutions 1, 2 and 3, and to down select solution 4 and 5.**

**Further discuss the following solution in the online session:**

**For multi-hop prevention:**

* **For initial access, WAB-gNB may use dedicated frequencies and/or PCIs and potential other legacy OTA parameters(e.g. NR CGI) .**
* **For HO, the target WAB-gNB should reject HO preparation including the S-NSSAI used for Backhauling.**
* **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 2: Capture on stage-2 that the formation of a multi-hop WAB-topology can be prevented by allocating dedicated frequencies and PCI values to WAB-gNB cells.**

**Proposal 3: Capture on stage-2 that to the formation of a prevent multi-hop WAB topology, the target WAB-gNB can reject handover requests based on the WAB-specific slice ID using legacy behaviour and signaling.**

**Proposal 4: Capture on stage-2 that to prevent formation of a multi-hop WAB topology, the WAB-gNB can broadcast a “WAB-barred” indicator in SIB, and the WAB-MT may avoid (re)selection of cells broadcasting this indicator.**

**Proposal 5: Capture solutions 1, 2 and 3 in the Reply LS to SA2 as a RAN-based remedy to issue-1a.**

**Proposal 6a: Capture on stage-2 that the WAB-MT can be prevented to connect to its collocated WAB-gNB based on implementation, where the WAB-MT avoids (re)selecting cells of its collocated WAB-gNB and including these cells in measurement reports.**

**Proposal 6b: Capture P6 in the Reply LS to SA2 as a RAN-based remedy to issue-1b.**

**Proposal 6c: Send LS to RAN2 to request support of “WAB barred” in SIB1 for WAB-gNB cells.**

**Proposal 4: In order to avoid multi-hop WAB topology, RAN3 to agree the following revised version of solution 3 to cover both initial access and handover cases.**

* **Revised version of solution 3: WAB-gNB-cells broadcast a new indicator in SIB to bar WAB-MT, and the WAB-MT avoids (re)selection and reporting measurement results of cells broadcasting this indicator.**

**Proposal 2-1: Multi-hop topology for connected mode WAB-MT can be avoided by solution 2. Multi-hop topology for idle mode WAB-MT can be avoided by solution 3.**

**Proposal 2-2:** **RAN3 send response LS to SA2 on multi-hop topology avoidance as Annex A.**

**Proposal 5: Solution 1 (dedicated OTA parameters) is used for preventing multihop in WAB topologies and for prevention of Xn setup between WAB-gNBs.**

**Proposal 5-1: RAN3 adopt Solution 2.**

**Proposal 5-2: in case Solution 2 cannot be agreed, RAN3 adopt Solution 1.**

**Proposal 5-3: WAB-UE knows whether a cell belongs to the co-located WAB-gNB by implementation.**

**Proposal 1: RAN3 to select solution 1(uses dedicated frequencies and/or PCIs) and solution 2(Use the slice dedicated for backhauling) for multi hop prevention during initial access.**

**Proposal 2: RAN3 to select solution 1(uses dedicated frequencies and/or PCIs) and solution 2(Use the slice dedicated for backhauling) for multi hop prevention during WAB-MT mobility.**

**Proposal 6: For multi-hop avoidance, RAN3 agree the following solutions:**

* **Solution 3: 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.**
* **Solution5: In case of handover for a WAB-node, the WAB-node indication is included in the HO request, then the target BH-RAN node can perform access control for this WAB-node.**

**Proposal 4: WAB-gNB broadcasts a WAB indication in SIB1 to avoid other WAB-MT to camp on the cell of WAB-gNB. And in case of handover, a new WAB-node indication is included in the handover request for access control at the target BH RAN node.**

**Proposal 1: For multi-hop WAB, RAN3 to exclude the slice-based solution as it will introduce extra delay and overhead in access scenarios.**

**Proposal 2: To avoid multi-hop WAB, RAN3 to choose the following options:**

* **WAB-gNB-cells broadcast a WAB-cell indicator in SIB.**
* **In case of handover for a WAB-node, a new WAB-node indication is included in the HO request, then the target WAB-gNB can reject the handover request for a WAB-MT.**

**Proposal 3: RAN3 to consider the following information exchanged between RAN nodes over Xn-AP to support the mobility of WAB-MT:**

* ***WAB Node Indication* and/or *BH PDU Session Indication* in XnAP: HANDOVER REQUEST message.**
* ***WAB Node Indication* and/or *the information of cells served by the WAB-node* in XN SETUP REQUEST and XN SETUP RESPONSE message.**

### Avoiding Xn establishment between WAB-gNBs

**Proposal 2-1: Since the WAB-gNB supports the functionality of a legacy gNB, it can establish Xn connections with BH gNB’s and WAB-gNBs, and it can use the legacy procedures to discover neighbour gNBs and resolve their TNL addresses.**

**Proposal 2-2: The WAB-gNB can prevent Xn establishment with a peer WAB-gNB based on implementation.**

**Proposal 2-3: The WAB-gNB can discover that a peer RAN node is a WAB-gNB based on a WAB-specific frequency, a WAB-specific PCI value and/or a WAB-specific indicator provided for a served cell in the Xn Setup procedure.**

**Proposal 2-4: WAB-related enhancements to Xn are ignored by a BH RAN node that does not support WAB.**

### Additional ULI

**Proposal: Additional ULI for WAB consists of TAC and Cell ID, which are determined by the WAB-node based on WAB-node’s physical location. This solution allows Opton1 and Option3.**

**It is up to SA2 to support one of Opton1 and Option3 or both.**

- option 1: mapped TAC/Cell ID based on geo-location of the MWAB based on input from OAM.

- option 2: geo-location of the MWAB.

- option 3: TAC/Cell ID of the cell serving the MWAB-UE in other PLMN.

Samsung take the reply LS.

**NTN BH related issues to be continued…**

**Proposal 7a: In case the WAB-node’s access PLMN and backhaul PLMN are the same, the UE’s ULI to include the cell ID and TAC of MT’s served cell for the same reasons and in the same manner as defined for mobile IAB.**

**Proposal 7b: In case the WAB-node’s access PLMN and backhaul PLMN are the different, the UE’s ULI to also include a cell ID and TAC related to the MT’s served cell (SA’2 options 1 and 3). Whether this information represents the WAB-MT’s explicit or mapped cell/TAC mapped is up to implementation.**

**Proposal: Additional ULI for WAB consists of TAC and Cell ID, which are determined by the WAB-node based on WAB-node’s physical location.**

**Proposal 5-4: For issue-2, RAN3 to reply to SA2 that Option 2 or Option 3 defined in clause 8.5 of TR 23.700-06 is preferred.**

Proposal 8: RAN3 to provide unified signalling design for additional ULI report in both intra-PLMN case and inter-PLMN case, then option 3 is recommended for the inter-PLMN case.

**Proposal 3: Option 3 (TAC/Cell ID of the cell serving the MWAB-UE in other PLMN) is selected for the additional ULI when PLMN serving the WAB-MT and the PLMN broadcasted by the WAB-gNB are different.**

**Proposal 7a: In case the WAB-node’s access PLMN and backhaul PLMN are the same, the UE’s ULI to include the cell ID and TAC of MT’s served cell for the same reasons and in the same manner as defined for mobile IAB.**

**Proposal 7b: In case the WAB-node’s access PLMN and backhaul PLMN are the different, the UE’s ULI to also include a cell ID and TAC related to the MT’s served cell (SA’2 options 1 and 3). Whether this information represents the WAB-MT’s explicit or mapped cell/TAC mapped is up to implementation.**

**Proposal 8: RAN3 to not support including the WAB-MT’s geolocation information into the UE’s ULI (SA2’s option 2) since this requires additional enhancements on WAB-node and AMF.**

**Proposal 6: If mapped cell is used as additional ULI, it needs to be discussed how could the WAB-gNB obtain the mapped cell ID of BH-gNB.**

**Proposal 7: It needs to be discussed how to define the TAC format in the additional ULI when the WAB-MT accesses the network via NTN, inluding whether one TAC or multiple TACs are included, and whether the UE Location Derived TAC is included in the additional ULI.**

**Proposal 3-1: All three options for the WAB node providing additional ULI are feasible, it's up to SA2 to determine which option to use.**

Additional ULI when WAB-MT accesses via NTN

**Observation 2: It needs to be discussed whether Uu cell ID of MT’s serving cell or mapped cell ID is included as additional ULI when WAB-MT accesses via NTN.**

**Observation 3: If Uu cell ID is used, it may won’t help since the Uu cell ID doesn’t really reflect the location of the WAB node.**

**Proposal 6: If mapped cell is used as additional ULI, it needs to be discussed how could the WAB-gNB obtain the mapped cell ID of BH-gNB.**

**Observation 4: Multiple TACs and UE Location Derived TAC is included as ULI in NR NTN if the UE is accessing via NTN.**

**Proposal 7: It needs to be discussed how to define the TAC format in the additional ULI when the WAB-MT accesses the network via NTN, inluding whether one TAC or multiple TACs are included, and whether the UE Location Derived TAC is included in the additional ULI.**

### Mobility

1. RAN3 send LS to SA2 to confirm the feasibility of the option B1, i.e., Single WAB-gNB with a single cell using mobility registration update due to TAC change.

**Proposal 9: The two logical gNB solution can support UE’s AMF change during WAB-gNB mobility.**

**Capture this solution in 38.401 WAB baseline CR.**

**Further discuss the following in the online session.**

1. end LS to SA2 to confirm the feasibility of the option B1, i.e., Single WAB-gNB with a single cell using mobility registration update due to TAC change.

**Proposal 1: Update Stage-2 to capture the WAB-node mobility without change of UE’s AMF.**

**Proposal 2-1: To support the mobility of WAB-node with the change of UE’s AMF, and the support for PCI change, the WAB-gNB need to have two logical cells active simultaneously.**

**Proposal 2-2: WAB-gNB shall use different Supported TA List for setting up NG connection with “New” AMF*.***

**Proposal 3-1: When the UEs’ AMF changes for UEs connected to the WAB-node, the WAB-node to establish a second logical WAB-gNB and perform NG handover of these UEs to the second logical WAB-gNB as described in TR 38.799.**

**Proposal 3-2: Deprioritize solutions to facilitate AMF change using single-WAB-gNB since these solutions require enhancements to AMF and/or RAN/CN procedures which are not needed when using two logical WAB-gNBs.**

**Proposal 9: The two logical gNB solution is used for the UE’s AMF change during WAB-gNB mobility since it can be supported by implementation without any standard impact. An RAN3 sends an LS to SA2 to inform the RAN3 agreements.**

1. RAN3 send LS to SA2 to confirm the feasibility of the option B1, i.e., Single WAB-gNB with a single cell using mobility registration update due to TAC change.

**Proposal 5-1: When WAB-gNB initiates NG handover to change AMF of UE, it sets the “selected TAI” IE in Handover Required message as the new TAI corresponding to its current location for the old AMF to select the target AMF.**

**Proposal 5-2: NG handover can be used to change AMF for the connected UEs in case gNB-ID of WAB-gNB is not changed.**

**Proposal 5-3: WAB-gNB can instantiate multiple cells or it can activate the new cell(s) after deactivating the old cell(s). It depends on WAB-gNB’s capability/implementation whether to instantiate multiple cells simultaneously.**

### Handling of WAB-gNB’s traffic during PDU session change

**Proposal 4-1: When the WAB-MT changes the WAB-MT’s PDU session, the following legacy procedures can be used to migrate the WAB-gNB’s interfaces to the new IP addresses:**

* **NG-C and Xn-C can be migrated 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.**
* **Xn-U GTP-U tunnels used for DC can be migrated via the Xn S-NG-RAN NODE MODIFICATION PROCEDURES.**
* **Xn-U GTP-U tunnels used during UE handover do not need to be migrated since short-lived.**

**Proposal 4-2: When the WAB-MT changes the WAB-MT’s PDU session, the migration of OAM traffic to the new IP address(es) is out of scope.**

1. During the mobility of WAB node, there is no impact on the the WAB-gNB’s traffic during WAB-node mobility if a tunnel carried via BH PDU session is used to protect the WAB-gNB’s traffic.
2. If the WAB-gNB’s traffic reuse the WAB-MT’s IP address, the WAB-gNB’s traffic should be redirected to the new IP address using legacy procedures when the WAB-MT’s IP address is updated during mobility.

**Proposal 8: When the WAB-MT’s BH PDU session changes, WAB-gNB’s NG-C connection and NG-U traffic needs to be re-directed to the new TNL address of the WAB-gNB using existing mechanism.**

**Proposal 4: WAB-gNB may update the TNL addresses used for NG or Xn connection using the new IP address of the BH PDU session when the BH PDU session is re-established.** **The TNL addresses for NG or Xn connection can be updated using existing mechanism.**

### NG connection management

**Proposal 1: adopt the NR NTN decision for NG Removal.**

**The proposed Stage-2 TP can be found in Annex – TP for TS 38.401**

Based on the OAM configuration, the WAB-gNB can setup NG interface with an AMF. When disconnecting from an AMF is required due to e.g. the WAB-node move out of the serving area of the AMF, the WAB-gNB may request the removal of the NG interface by triggering the NG Removal procedure toward the AMF.

**Proposal 1-1: The NG connection(s) of a WAB-gNB can be removed upon WAB-node mobility, or when the authorization status of the WAB-gNB becomes “not authorized”.**

**Proposal 1-2: Introduce a “WAB-gNB” indication in the NG SETUP REQUEST message.**

1. RAN3 to design unified NG removal procedure for WAB and NTN.

**Proposal 10: NG suspend/resume is supported for NG connection management of a WAB-gNB.**

**Proposal 6-1: Specify NG removal for WAB scenario in TS 38.300.**

**Proposal 6-2: Whether to introduce NG suspend/resume can wait for NTN's conclusion.**

**Proposal 5-1: RAN3 to agree introducing the NG removal procedure for WAB node.**

**Proposal 5-2: RAN3 to agree introducing the NG suspend/resume procedure for WAB node, and no need to wait the conclusion of NTN.**

### Xn connection management

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

**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 2-1: Since the WAB-gNB supports the functionality of a legacy gNB, it can establish Xn connections with BH gNB’s and WAB-gNBs, and it can use the legacy procedures to discover neighbour gNBs and resolve their TNL addresses.**

**Proposal 2-2: The WAB-gNB can prevent Xn establishment with a peer WAB-gNB based on implementation.**

**Proposal 2-3: The WAB-gNB can discover that a peer RAN node is a WAB-gNB based on a WAB-specific frequency, a WAB-specific PCI value and/or a WAB-specific indicator provided for a served cell in the Xn Setup procedure.**

**Proposal 2-4: WAB-related enhancements to Xn are ignored by a BH RAN node that does not support WAB.**

**Proposal 4-1: The WAB-gNB includes an ID of the co-located WAB-MT in the XN SETUP REQUEST or in the NG-RAN CONFIGURATION UPDATE message sent to the BH-gNB.**

**Proposal 4-2: Xn connection between WAB-gNBs can be established.**

**Proposal 4-3: The WAB-gNB should be notified about the target BH-gNB for the WAB-MT HO.**

**Proposal 4-4: The WAB-gNB should be aware of whether the BH link for the WAB-MT is TN or NTN.**

**Proposal 6: Discuss the introduction of WAB-specific cause values for XnAP and NGAP.**

**Proposal 11: 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 12: 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 1-1: WAB-gNB can recognize BH-RAN-node via SIB1 of the cell serving the WAB-MT.**

**Proposal 1-2: WAB-gNB obtains IP address of the BH-RAN-node via legacy Xn-C TNL address discovery mechanism and sets up Xn connection with it.**

**Proposal 1-3: If WAB-gNB establishes Xn connection with BH-RAN-node, it discovers neighbour cells through Xn messages sent from the BH-RAN-node.**

**Proposal 1-4: WAB-gNB looks up the IP address(es) of the neighbour nodes using legacy Xn-C TNL address discovery mechanism and set up Xn connections with surrounding RAN nodes.**

**Proposal 1-5: WAB cell specific info can be added to the serving cell information and the neighbour cell information in Xn messages.**

**Proposal 1-6: WAB-gNB considers the cell not included in the serving/neighbour cell information of current BH-RAN-node as no longer acting as the neighbour cell.**

**Proposal 1-7: WAB-gNB removes Xn with the with the NG-RAN nodes which do not serve any neighbour cell of the WAB-gNB.**

**Proposal 1: For Xn connection between WAB-gNB and its BH RAN node, it's the WAB-gNB to trigger the Xn setup procedure.**

**Proposal 2: For Xn connection between WAB-gNB and surrounding RAN node, both the WAB-gNB and the surrounding RAN node can trigger the Xn setup procedure.**

**Proposal 3: WAB-gNB can obtain the type of another WAB-gNB and then avoid to setup Xn interface to another WAB-gNB. Or the WAB-gNB can include the type information in the Xn setup request message.**

**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.**

**Proposal 3-1: In order to avoid the Xn setup between WAB-gNBs, the indication of WAB node should be communicated during the Xn setup procedure.**

**Proposal 3-2: The BH gNB can inform the WAB-gNB** **that which neighbor nodes of the BH gNB are the WAB nodes during the Xn setup procedure.**

### WAB node authorization

**Proposal 1-1: In alignment with SA2, RAN3 confirms that the WAB-MT is authorized to support a PDU session for backhauling based on WAB-specific S-NSSAI and DNN, and that this authorization can be time- and location-dependent.**

**Proposal 1-2: In alignment with SA2, RAN3 confirms that the WAB-gNB’s service authorization is based on OAM configuration.**

**Proposal 1-3: In alignment with SA2, RAN3 confirms that when the WAB-gNB’s authorization status changes from “authorized” to “not authorized”, the UEs served by the WAB-gNB should be handed over to other RAN nodes or released, and then the WAB-gNB’s NG and Xn connection(s) should be removed.**

**Proposal 1-4: When the WAB-gNB’s authorization status changes from “not authorized” to “authorized”, the WAB-gNB can reestablish NG connection and potentially Xn connection(s) and start serving UEs.**

**Proposal 1-5: The WAB-MT should be authorized to support BH PDU sessions while the collocated WAB-gNB is serving UEs and has backhaul connections established. RAN3 assumes that this time alignment can be achieved based on configuration.**

**Proposal 2: When the authorization status of a WAB-gNB changes from “authorized” to “not authorized” (along with the authorization status of its co-located WAB-MT):**

* **The WAB-gNB node attempts to hand over and/or releases the UEs.**
* **The NG and Xn connections of the WAB-gNB are removed.**
* **Optionally, some or all PDU sessions of the WAB-MT may be released, and the WAB-MT may be de-registered from the network.**
1. The UP resources for the established BH PDU session(s) should be released if the WAB-MT/WAB-gNB is non-authorized.
2. The WAB-MT informs the 5GC serving the WAB-MT of the de-authorization status of the WAB-gNB in time.

**Proposal 1-1: Capture the WAB authorization function in TS 38.401 including the WAB-node behaviors in case authorization status of WAB-gNB/WAB-MT changes.**

**Proposal 1-2: The WAB-node releases the SCTP connections and BH PDU session(s) of the WAB-MT if the authorization status of WAB-MT is changed to “not authorized”, and re-establish the BH PDU session(s) if the authorization status of WAB-MT is changed back to “authorized”.**

**Proposal 5: In case WAB-MT becomes not-authorized, WAB-gNB will be turned into not-authorized by OAM accordingly, and the UEs served by the WAB-gNB can either be handed over to other RAN nodes or they can be released, after which the NG and Xn connection(s) of the WAB-gNB can be removed.**

**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 WAB-gNB is not authorized and the WAB-MT is authorized, RAN3 needs to discuss how to handle the BH PDU session.**

### Topology discovery

**Proposal 17: WAB-gNB sends identity of its co-located WAB-MT (e.g., C-RNTI and cell ID) to the BH-gNB via Xn to enable topology discovery.**

- Option 1: WAB-gNB sends identity of its co-located WAB-MT to the BH-gNB via Xn.

- Option 2: WAB-MT sends identity of its co-located WAB-gNB to the BH-gNB via RRC.

### Change of backhaul resources during mobility

**Proposal 3-1: BH-gNB can indicate to the WAB-gNB that specific BH resources cannot be maintained.**

**Proposal 3-2: BH-gNB is aware which slices/PDU sessions are associated with specific resources at the WAB-gNB and may use this information to determine whether a target BH-gNB is able to maintain BH resources for the WAB-gNB.**

### PCI configuration and collision avoidance

**Proposal 5: PCI configuration and PCI collision avoidance to follow the same procedure as defined for mobile IAB in TS 38.401, clause 7.8.**

**Proposal 6: The legacy mechanisms can be reused for PCI collision detection of WAB-gNB. The PCI space can be partitioned between WAB-gNB cells and stationary cells by implementation.**

1. The PCI of the WAB-gNB is (re-)configured by OAM, same as legacy gNB.
2. PCI space partition for mobile IAB is also applicable for the PCI collision avoidance of WAB-node, but up to implementation.

**Proposal 13: The PCI of WAB-gNB’s cell is configured by the OAM, and it can be reconfigured during the mobility of WAB-node in case PCI collision is detected.**

**Proposal 14: RAN3 to discuss how to avoid PCI collision and re-configure PCI for WAB-gNB cell when there is no Xn interface between the WAB-gNB and neighboour gNBs.**

**Proposal 7: The mechanism for PCI collision avoidance in mobile IAB can be reused for WAB.**

**Proposal 6: For WAB, the legacy mechanisms can be reused for PCI collision detection. The PCI space can be partitioned between WAB cells and stationary cells by implementation.**

**Proposal 7: Due to CU-DU split is out-of-scope of R19 WAB, PCI reconfiguration via F1AP for mobile IAB-node is not appliable for WAB node.**

### Resource coordination

**Proposal 7-1: For in-band backhauling in non-roaming scenarios, introduce a new XnAP procedure for a WAB-gNB and its BH-gNB to coordinate the resources of this WAB-gNB and its co-located WAB-MT.**

**Proposal 7-2: 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 7-3: RAN3 assumes out-of-band backhauling when the WAB-gNB and the WAB-MT are served by different PLMNs.**

**Proposal 6-1: Xn signalling to exchange cell resource configurations specified for IAB can be made applicable to WAB. F1 enhancements and lower layer control is out of the WI scope.**

**Proposal 6-2: The BH-gNB detects the co-location of the WAB-gNB and WAB-MT during the Xn Setup procedure initiated by the WAB-gNB, via the WAB-MT’s ID (e.g. C-RNTI) received from the WAB-gNB in XN SETUP REQUEST message or Xn SETUP RESPONSE message.**

**Proposal 11: If the BH gNB uses CU-DU split architecture, the F1 signaling designed for IAB resource multiplexing is reused via the F1 signaling between the CU and DU parts of the BH-gNB.**

**Proposal 12: 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 13: 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.**

**Proposal 14: RAN3 to discuss whether BH-gNB considers cell specific signaling/channel resources as hard resources at the IAB-DU.**

**Proposal 15: WAB resource configuraiton of neighbour gNB is exchanged between WAB-gNB and BH-gNB, or between BH-gNBs via Xn signaling.**

**Proposal 16: BH-gNB sends its per-child MT link-NA resource configuration to the WAB-gNB via Xn.**

**Proposal 2-1: Three types of symbol (i.e., hard, soft and unavailable) can be used for resource multiplex of WAB.** **WAB-gNB can determine whether the soft symbols is used relying on implementation.**

**Proposal 2-2: The resource coordination information sent from WAB-node to BH-RAN node includes:**

* **Resource configuration including slot format and symbol type for each WAB-gNB cell,**
* **(Proposed) resource configuration including slot format for BH-RAN-node’s cell(s),**
* **WAB-node duplex capability,**
* **Cell specific resources configured for each WAB-gNB cell.**

**Proposal 2-3: The resource coordination information sent from BH-RAN-node to WAB-node includes:**

* **Resource configuration including slot format for each cell,**
* **(Proposed) resource configuration including slot format and/or symbol type for WAB-gNB’s cell(s).**
* **Proposal 2-4: Exchanging resource coordination information between BH-RAN-node and WAB-node over Xn.**
* **Proposal 2-5: BH-RAN-node discovers the co-location of WAB-gNB WAB-MT via the WAB-gNB reporting the identity of the WAB-MT over Xn.**

**Proposal 1: To enable that the procedure of Xn setup and resource multiplexing can be initiated by the WAB-gNB or the BH gNB, it is better for WAB-MT to inform the collocation information to the BH gNB.**

**Proposal 8: The WAB-gNB can signal its D/U/F configuration to the BH RAN node over Xn.**

**Proposal 9: Legacy F1AP GNB-DU RESOURCE CONFIGURATION can be reused for resource configuration on gNB-DU of the BH RAN node.**

**Proposal 10: NG-C signalling and NG-U traffic can be mapped to the same PDU session between WAB-MT and MT’s UPF, alternatively, different types of NG-C signalling and NG-U traffic with different QoS requirements can be mapped to different PDU sessions.**

### Awareness of WAB at BH-RAN node

**Proposal 8: WAB-MT shall be able to access a legacy gNB without WAB specific enhancement**

**Proposal 9: An indication could be broadcasted by BH-RAN node so that WAB-MT could be aware of the capability of the gNB.**

**Proposal 10: RAN3 to send an LS to RAN2 to trigger the discussion if RAN3 assumes that it would be beneficial to broadcast an indication to indicate that the gNB supports WAB enhancement.**

### In-band or out-band deployments

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

**Proposal 4: To support the in-band WAB deployment, the BH-RAN must be upgraded to aware of WAB and can support the resource multiplexing. RAN3 to discuss how to ensure the in-band WAB selects a proper BH-gNB.**

### NTN backhaul

**Proposal 4-4: The WAB-gNB should be aware of whether the BH link for the WAB-MT is TN or NTN.**

**Proposal 5: If the backhaul is NTN link, the UE’s CN should know the BH link type is NTN.**

### Others

**Proposal 4: To guarantee the QoS of NG-C/Xn-C and NG-U/Xn-U traffic over the BH link,**

* **For uplink, WAB-node maps the traffic to QoS flows of WAB-MT, and WAB-MT maps the QoS flows to DRBs.**
* **For downlink, BH-UPF maps the traffic to QoS flows of WAB-MT, and BH-gNB maps the QoS flows to DRBs.**

**Proposal 5: Coordination between WAB-MT and BH-gNB may be needed to mitigate the impact of degradation and congestion on the BH link.**

**Proposal 8: The access and the BH network can coordinate for mitigating BH link degradation.**

**Proposal 9: Calculation of the WAB-gNB PDB (i.e., the WAB counterpart of the 5G-AN PDB specified in TS 23.501) considers the PDB of the BH network.**

**Proposal 1: RAN3 to capture that a tunnel may be used to transfer the WAB-gNB’s traffic in TS 38.401.**

**Proposal 2: RAN3 to agree the draft TP to TS 38.401 in Annex A.**

**Proposal 3: If RAN3 decides to specify the scenario where ng-eNB serves WAB-MT, an LS is sent to SA2 so that SA2 would update the specification accordingly.**

**Proposal 4: If RAN3 decides to specify the scenario where ng-eNB serves WAB-MT, it needs to be captured in TS 36.300 that WAB also applies for EUTRA connected to 5GC where ng-eNB shall be considered as the BH-RAN node instead of gNB.**

**Proposal 6: If RAN3 decides not to specify the scenario where ng-eNB serves WAB-MT, the definition of BH-RAN-node needs to be removed in TS 38.401, and “BH-RAN node” used in the text needs to replaced with “BH-gNB”.**

A WAB-node consists of a WAB-gNB and a WAB-MT. The WAB-gNB is based on the gNB functionality specified in TS 38.300 [2] and serves UEs by means of a terrestrial NR Uu radio link.

The WAB-MT is served by a BH-RAN-node. The WAB-gNB traffic, including NG, Xn and OAM traffic is transported via backhaul PDU session(s) of the WAB-MT.

NOTE: The use of other types of backhaul, e.g. non-3GPP backhaul, is up to implementation. The WAB-gNB’s OAM, NG or Xn traffic may be encapsulated in a tunnel and then transferred via MT’s BH PDU session by implementation.

## 5G Femto

### General

**Proposal 5: Confirm the Working Assumption that an NR Femto may serve more than one cell.**

**Proposal2: Capture the following in section 4.x.3.1**

**NG-U is defined as specified in clause 4.3.1.1 regardless of whether it is concentrated in the NR Femto GW.**

**Add dot line box for GW (from L1 to IP layer) in the following figure.**



Fig 1. User plane protocol stack in NR Femto

**What would be roles of Femto GW for user plane?**

**Option1: GTP-U proxy**

**Option2: UDP proxy**

**Option3: routing at the IP (FFS whether NAT support)**

**GTP-U proxy and UDP proxy are ruled out.**

**Proposal 4: TS 38.300 captures reference for NG control plane for NR Femto without NR Femto GW.**



Figure 4.X.3.2-1: Control plane for NG Interface for NR Femto to AMF with the NR Femto GW

**Proposal 1: The NR Femto shall only connect to a single NR Femto GW at one time when the NR Femto connects via the NR Femto GW.**

**Proposal 2: The NR Femto GW supports NG-Flex configuration and can simultaneously connect to multiple AMFs.**

### Access control

**Proposal 6: Referencing existing definitions and specification is sufficient for access control with CAG – all functionality is already specified.**

**Proposal 7: 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 there is no need to introduce such definitions.**

### 4.x.4 Access Control

Cells served by an NR Femto node may be deployed as part of a PNI-NPN (see clause 4.8) in order to restrict access to UEs according to the respective subscription.

NOTE: The NR Femto node may use the CAG mechanism for PNI NPN (see clause 16.7.4) as follows:

- The NR Femto node may activate a PLMN cell, which can be accessed by legacy UE without access control of CAG.

- The NR Femto may activate a cell shared by both PLMN and CAG, 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 cell is viewed as a normal PLMN cell.

- The NR Femto node may activate an NPN-only cell by broadcasting the *cellReservedForOtherUse IE* with value “true”, then this cell can only be accessed by the UEs whose allowed CAG list includes a CAG-ID broadcasted by the cell.

1. RAN3 to avoid defining access mode for the NR femto. No access mode indication is needed in UE associated NGAP messages for the access mode determination and verification.
2. NR Femto GW is not responsible for CAG access control. The CAG access control is implemented on the AMF.
3. RAN3 to further coordinate with SA2 and SA3 about whether the NR femto GW/AMF needs to determine/verify that the NR femto serves NPN-only cell(s) or cell(s) can shared by both PLMN and CAG.

**Proposal 6: Three kinds of access control is captured as a note without corresponding access modes being mentioned in spec.**

### NR Femto GW related issues

**Proposal 3**: send the LS in [4] to SA3 to check whether the verification aspects which applied to HeNB GW architecture apply to NR Femto GW architecture.

**Proposal 1: When the NR Femto GW is not present, the NG UP protocol stack for an NR Femto is the same as currently specified in Sec. 4.3.1.1 of TS 38.300, so a reference to that section is sufficient.**

**Proposal 2: There is no need to mention GTP-U level switching at the NR Femto GW, at least in normative text.**

**Proposal 3: Capture a single figure for NG UP for the case with the NR Femto GW, highlighting in the figure and in the description text that different possible switching at the NR Femto GW are possible (e.g. UDP level, IP level).**

**Proposal 4: When the NR Femto GW is not present, the NG CP protocol stack for an NR Femto is the same as currently specified in Sec. 4.3.1.2 of TS 38.300, so adding a reference to that section in the current text is sufficient; Fig. 4.X.3.2-1 is not needed.**

**Proposal 3: A NR Femto node shall only connect to a single NR Femto GW at one time, and will not simultaneously connect to another NR Femto GW or AMF.**

**Proposal 4: Not support Xn interface between NR Femto GW and other nodes.**

### Functional split

**Proposal 1**: discuss the functional aspects of NR Femto, NR Femto GW and AMF presented in the TP for TS 38.300 draft CR in [2] to provide equivalent support of functionalities as the HeNB subsystem.

**Proposal 2**: discuss the corresponding stage 3 aspects with the TS 38.413 CR proposed in [3].

1. The NR Femto node forwards the UE’s requested S-NSSAI to the NR Femto GW in INITIAL UE MESSAGE. The NR Femto GW selects proper AMF accordingly.
2. RAN3 to agree the TP for TS 38.300 and 38.413 to capture spec impact introduced by the functional split for NR Femto.
3. RAN3 assumes NR Femto GW verifies the Femto node ID in NG SETUP REQUEST, PWS RESTART INDICATION and PWS FAILURE INDICATION, and check with SA3 for confirmation.

### Local breakout

**Proposal 8: Take the appropriate text from Sec. 5.4 of TR 38.799 as baseline for a simple definition for local breakout.**

**Proposal 9: Agree the text proposal in [5] for inclusion in the BL CR for stage 2.**

### Proximity

**Proposal 4**: Initiate discussions with RAN2 on how proximity works with NR Femto in 5G and possible functional impacts for RAN3.

**Proposal 8: Not introduce the proximity indication for NR Femto.**

### Femto ID

1. RAN3 to investigate how to design the gNB ID for NR femto node, i.e., whether to introduce dedicated NR Femto Node ID, or reuse the Global gNB ID.

**Proposal 2: The global gNB ID can be reused directly to identify the NR Femto node.**

### Issue of NG mobility impact

1. RAN3 to discuss how the AMF knows the association of the Femto GW and the Femto node, or to agree at most one Femto GW can be deployed in a TA.

### Others

**Proposal 4: The NR Femto GW shall host the NNSF function instead of the NR Femto nodes.**

**Proposal 5: The assistance information for NNSF if present should be transferred over NG interface from NR Femto node to NR Femto GW.**

**Proposal 5: NNSF function is located at the NR Femto GW.**

**Proposal 6: Support following Xn-based handover scenarios for NR Femto.**

**- gNB or any NR Femto node -> open access NR Femto node**

**- gNB or any NR Femto node -> hybrid access NR Femto node**

**- Hybrid access NR Femto node or closed access NR Femto node -> closed access NR Femto node**

**- Any NR Femto node -> gNB**

**Proposal 7: For the UE handover of NR Femto, the handover cannot be supported if the target cell is a non-CAG cell.**

**Ericsson TP**

**Revision of 7454**

**Access control**

**Huawei TP**

**Protocol stack**

**Nokia TP**

**Functional split**

**ZTE TP**

**38.410**

**Revision of 7731**

When the NR Femto connects to a Femto GW, selection of an AMF at UE attachment is hosted by the NR Femto GW instead of the NR Femto.

**Hosted => performed**

**FFS on the wording of UE attachment**

**[R3-247486]**

### 4.X.2 Functional Split

An NR Femto hosts the same functions as a gNB as described in clause 4.1, with the following additional specifics in case of connection to the NR Femto GW:

- Discovery of a suitable Serving NR Femto GW;

- An NR Femto shall only connect to a single NR Femto GW at one time, namely no NG-C Flex function shall be used at the NR Femto:

- The NR Femto will not simultaneously connect to another NR Femto GW, or another AMF.

- The TAC and PLMN ID used by the NR Femto shall also be supported by the NR Femto GW;

- Selection of an AMF at UE attachment is hosted by the NR Femto GW instead of the NR Femto. Upon reception of the GUAMI from a UE, the NR Femto shall include it in the INITIAL UE MESSAGE message.

- NR Femtos may be deployed without network planning. An NR Femto may be moved from one geographical area to another and therefore it may need to connect to different NR Femto GWs depending on its location;

- Signalling the GUAMI of the Source AMF and the *Source AMF UE NGAP ID* to the NR Femto GW in the NGAP PATH SWITCH REQUEST message.

<<<<<<<<<<<<<<<<<<<< Unmodified Text Omitted >>>>>>>>>>>>>>>>>>>>

The NR Femto GW hosts the following functions:

- Relaying UE-associated NG application part messages between the AMF serving the UE and the NR Femto serving the UE, except the UE CONTEXT RELEASE REQUEST message received from the NR Femto with an explicit GW Context Release Indication. In that case, the NR Femto GW terminates the NGAP UE Context Release Request procedure and releases the UE context if it determines that the UE identified by the received UE NGAP IDs is no longer served by an NR Femto attached to it. Otherwise it ignores the message.

- In case of NGAP INITIAL CONTEXT SETUP REQUEST message and NGAP HANDOVER REQUEST message, informing the NR Femto about any GUAMI corresponding to the serving AMF, the AMF UE NGAP ID assigned by the AMF and the AMF UE NGAP ID assigned by the NR Femto GW for the UE. In case of NGAP PATH SWITCH REQUEST ACKNOWLEDGE message, informing the NR Femto about the AMF UE NGAP ID assigned by the AMF and the AMF UE NGAP ID assigned by the NR Femto GW for the UE.

NOTE: In case of NGAP INITIAL UE MESSAGE message, whether to verify, for a closed NR Femto, that the indicated cell access mode and CAG ID are valid for that NR Femto is pending SA3 study.

- Terminating non-UE associated NG application part procedures towards the NR Femto and towards the AMF. In case of NG PWS RESTART INDICATION message and PWS FAILURE INDICATION message, replacing the gNB ID of the NR Femto by the NR Femto GW ID before sending the PWS RESTART INDICATION message (respectively the PWS FAILURE INDICATION message) to the AMF.

NOTE: In case of NG SETUP REQUEST message, whether to verify that the identity used by the NR Femto is valid and determining whether the access mode of the NR Femto is closed or not is pending SA3 study.

NOTE: In case of NG PWS RESTART INDICATION message and PWS FAILURE INDICATION message, whether to verify that the indicated cell identity is valid is pending SA3 study.

- Upon receiving an OVERLOAD START/STOP message, the NR Femto GW should send the OVERLOAD START/STOP message towards the NR Femto(s) including in the message the identities of the affected AMF node(s). The NR Femto uses this information received from the OVERLOAD START message to identify to which traffic the above defined rejections shall be applied. 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.

NOTE: If an NR Femto GW is deployed, non-UE associated procedures shall be run between NR Femtos and the NR Femto GW and between the NR Femto GW and the AMF.

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

- Routing the NGAP PATH SWITCH REQUEST message towards the AMF based on the GUAMI of the source AMF received from the NR Femto.

A list of CAG IDs may be included in the NGAP PAGING message. If included, the NR Femto GW may use the list of CAG IDs for paging optimisation.

<<<<<<<<<<<<<<<<<<<< Unmodified Text Omitted >>>>>>>>>>>>>>>>>>>>

In addition to functions specified in clause 4.1, the AMF hosts the following functions:

- Access control for initial access of UEs that are members of Closed Access Groups (CAG):

NOTE: In case of an NR Femto directly connected, whether to verify that the identity used by the NR Femto is valid when receiving the NGAP SETUP REQUEST message and determining whether the access mode of the NR Femto is closed or not is pending SA3 study.

NOTE: In case of an NR Femto directly connected, whether to verify, for a closed NR Femto, that the indicated cell access mode and CAG ID are valid when receiving the NGAP INITIAL UE MESSAGE message is pending SA3 study.

NOTE: In case of an NR Femto directly connected, whether to verify that the indicated gNB identity of the NR Femto is valid when receiving the NGAP PWS RESTART INDICATION message and the NG PWS FAILURE INDICATION message is pending SA3 study.

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

NOTE: If routing ambiguities are to be avoided, a TAI used in an NR Femto GW should not be reused in another NR Femto GW.

NOTE: The AMF or NR Femto GW should not include the list of CAG IDs for paging when sending the paging message directly to an un-trusted NR Femto or gNB (to be checked by SA3).

<<<<<<<<<<<<<<<<<<<< End of Changes >>>>>>>>>>>>>>>>>>>>

**[R3-247488]**

**1. Overall Description:**

As previously indicated, RAN3 has agreed to have an NR Femto architecture in release 19 with an optional NR Femto GW for NG interface aligned with the 4g architecture deployment with HeNB GW.

RAN3 noticed that in 4g TS 36.300 specified multiple security verification checks to be performed by HeNB GW (respectively MME) to verify certain information sent by the HeNB. RAN3 would like SA3 to feedback on whether similar verification checks are needed in 5G to be performed by the NR Femto GW (respectively AMF).

The verification points to be checked by SA3 have been captured as NOTEs in the attached stage 2 RAN3 draft CR against TS 38.300.

**2. Actions:**

**To SA3 group:**

**ACTION:** RAN3 kindly ask SA3 to indicate whether the verification checks indicated in NOTEs pending SA3 in the attached CR for TS 38.300 are applicable in 5G for the NR femto GW (respectively AMF).

# Conclusion, Recommendations

# References

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| [R3-247109](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247109.zip) | (TP for WAB BL CR for TS 38.401): Functional Aspects of WAB-Nodes (Ericsson) | other |
| [R3-247110](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247110.zip) | Reply to SA2 Regarding UE Access Control and Additional ULI for WAB-Nodes (Ericsson) | discussion |
| [R3-247195](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247195.zip) | (TP to 38.401 36.300) Discussion on supporting WAB (ZTE Corporation) | other |
| [R3-247196](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247196.zip) | Discussion on other aspects for WAB and the reply LS to SA2 (ZTE Corporation) | other |
| [R3-247197](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247197.zip) | (TP to 38.305) Support of location service involving WAB-nodes (ZTE Corporation, Nokia, Nokia Shanghai Bell, Ericsson, Qualcomm, Lenovo, CATT) | other |
| [R3-247198](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247198.zip) | (TP to 38.455) Support of location service involving WAB-nodes (ZTE Corporation, Nokia, Nokia Shanghai Bell, Ericsson, Qualcomm, Lenovo, CATT) | other |
| [R3-247222](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247222.zip) | (TP to BL CR of 38.423 on WAB) Discussion on mobility and reliability for WAB (NEC) | other |
| [R3-247226](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247226.zip) |  Discussion on enhancements for WAB (CANON Research Centre France) | discussion |
| [R3-247227](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247227.zip) | (draft Reply LS to SA2 – TP to BL CR 38.401) Discussion on SA2 questions on multi-hop WAB and UE ULI (Qualcomm Inc.) | other |
| [R3-247228](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247228.zip) | (TP to BL CR 38.401) Discussion of aspects related to WAB (Qualcomm Inc.) | other |
| [R3-247229](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247229.zip) | BL draft CR to TS 38.300 on Support of WAB (Qualcomm, Ericsson, CATT, ZTE, Nokia, Nokia Shanghai Bell) | draftCR |
| [R3-247268](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247268.zip) | (draft Reply LSs to SA2) On support of WAB (CATT) | discussion |
| [R3-247269](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247269.zip) | Discussion on enhancements for WAB (CATT) | discussion |
| [R3-247279](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247279.zip) | Discussion on Wireless Access Backhaul (NTT DOCOMO INC.) | discussion |
| [R3-247342](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247342.zip) | (TP for TS 38.401) Discussion on NG management and Xn management for WAB (Nokia, Nokia Shanghai Bell) | other |
| [R3-247343](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247343.zip) | (TP for TS 38.423) Discussion on WAB mobility (Nokia, Nokia Shanghai Bell) | other |
| [R3-247353](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247353.zip) | (TP to BLCR for TS 38.410) Discussion on WAB mobility (Samsung) | discussion |
| [R3-247354](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247354.zip) | Discussion on other aspects for the support of WAB (Samsung) | discussion |
| [R3-247363](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247363.zip) | (TPs for TS 38.413) Architecture and Access control for WAB (Huawei) | other |
| [R3-247364](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247364.zip) | (TP for TS 38.401) Discussion on WAB related procedures (Huawei) | other |
| [R3-247428](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247428.zip) | Architecture and configuration for WAB-node (Lenovo) | discussion |
| [R3-247429](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247429.zip) | Discussion on WAB node migration (Lenovo) | discussion |
| [R3-247627](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247627.zip) | Discussion on RAN2 Impact and Functional Aspects of WAB (China Telecom) | discussion |
| [R3-247628](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247628.zip) | Discussion on Multi-hop Prevention and Authorization for WAB (China Telecom) | discussion |
| [R3-247722](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247722.zip) | Further consideration on support of WAB (LG Electronics) | discussion |
| [R3-247723](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247723.zip) | (TP to TS 38.401 and 38.423) TP for WAB support (LG Electronics) | other |

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| [R3-247018](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247018.zip) | Reply LS on Clarification regarding definition of 5G NR femto ownership (SA2(LGE)) | LS in |
| [R3-247208](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247208.zip) | Open issues for NR Femto (NEC) | discussion |
| [R3-247270](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247270.zip) | Discussion on stage-2 NR Femto (CATT) | discussion |
| [R3-247271](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247271.zip) | Impact to NGAP for NR Femto (CATT) | discussion |
| [R3-247280](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247280.zip) | Discussion on 5G femto (NTT DOCOMO INC.) | discussion |
| [R3-247355](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247355.zip) | (TP to TS 38.300) Discussion on NR Femto architecture and functional split (Samsung) | discussion |
| [R3-247356](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247356.zip) | (TP to TS 38.300) Discussion on access control for NR Femto (Samsung) | discussion |
| [R3-247365](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247365.zip) | (TP for TS 38.300/38.413) Architecture and functional split for NR Femto (Huawei) | other |
| [R3-247366](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247366.zip) | (TP for TS 38.300) Access control for NR Femto (Huawei) | other |
| [R3-247388](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247388.zip) | On NR Femto Architecture and functional split (China Telecom) | discussion |
| [R3-247430](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247430.zip) | Architecture and access control for NR Femto (Lenovo) | discussion |
| [R3-247431](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247431.zip) | TP to 38.300 for NR Femto (Lenovo) | other |
| [R3-247452](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247452.zip) | NR Femto - Further Stage 2 Aspects (Ericsson LM) | discussion |
| [R3-247454](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247454.zip) | NR Femto - Stage 2 TP (Ericsson) | other |
| [R3-247482](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247482.zip) | Completion of Functional aspects of NR Femto Architecture (Nokia ) | discussion |
| [R3-247486](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247486.zip) | [TP for BL CR NR Femto 38.300] Introduction of Functional aspects of NR Femto architecture (Nokia, TMO US, AT&T, Verizon Wireless, BT, Charter, ZTE) | other |
| [R3-247487](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247487.zip) | Introduction of NR Femto architecture with optional NR Femto GW (Nokia, TMO US, AT&T, Verizon Wireless, BT, Charter, ZTE) | CR1225r, TS 38.413 v18.3.0, Rel-19, Cat. B |
| [R3-247488](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247488.zip) | LS on Security verifications related to NR Femtos (Nokia ) | LS out To: SA3 CC:  |
| [R3-247648](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247648.zip) | Discussion on NR Femto Architecture and Functionality (Baicells) | discussion |
| [R3-247649](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247649.zip) | TP to BL CR for TS 38.300 on NR Femto (Baicells) | discussion |
| [R3-247724](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247724.zip) | (TP for TS 38.300) Functional split and Access control on 5G Femto (LG Electronics) | other |
| [R3-247730](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247730.zip) | TP for access control for NR Femto (ZTE corporation, Nokia) | discussion |
| [R3-247731](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_126%5CDocs%5CR3-247731.zip) | TP for 38.300&38.410 NR Femto (ZTE corporation) | discussion |