**3GPP TSG-RAN WG2 Meeting #105 *R2-19xxxxx***

**Athens, Greece, Feb 15th – March 1**

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| *CR-Form-v11.4* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.300** | **CR** | **<CR#>** | **rev** | **0** | **Current version:** | **15.4.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | CR to 38.300 on Integrated Access and Backhaul for NR | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | IAB\_NR | | | | |  | ***Date:*** | | | 2018-02 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | Change captures agreements from Study on IAB for NR and work item description for IAB approved by RAN#82. | | | | | | | | |
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| ***Summary of change:*** | | Descriptions of overall archtiecture including interfaces, protocol stacks and signaling; addition of new radio protocol sublayer and L2 structures for IAB | | | | | | | | |
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| ***Consequences if not approved:*** | | IAB feature cannot be supported | | | | | | | | |
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| ***Clauses affected:*** | |  | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |

FIRST CHANGE

# 3 Abbreviations and Definitions

## 3.1 Abbreviations

>>>> Skip

BH Backhaul

>>>> Skip

IAB Integrated access and backhaul

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## 3.2 Definitions

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**IAB-donor:** a gNB that provides functionality to support an NR backhaul for IAB-nodes.

**IAB-node:** a node that provides functionality to support connectivity to the network for the UE via an NR backhaul

**NR backhaul link:** NR link used for backhauling between an IAB node to an IAB-donor, and between IAB nodes in case of a multi-hop network.

NEXT CHANGE

# 4 Overall Architecture and Functional Split

## 4.1 Overall Architecture

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## 4.x Integrated Access and Backhaul

### 4.x.1 General

Integrated access and backhaul (IAB) enables wireless relaying for NR access by using NR radio for backhauling. NR access and backhaul can use the same or different frequency bands. The relaying node is referred to as the *IAB-node*. The backhaul can support single or multiple hops. The terminating node of NR backhauling on network side is referred to as the *IAB-donor gNB*, which represents a gNB with additional functionality to support IAB.

The IAB-node supports gNB-DU functionality to terminate the radio protocols of the NR interface, and F1 interfaces to the gNB-CU on the IAB-donor. NOTE: The architecture and the F1 interface for a functional split are defined in TS 38.401 [4].

In addition to gNB-DU functionality, the IAB-node also supports a subset of the NR Uu radio interface (MT part), e.g. PHY and layer-2 functionality to wirelessly connect to a gNB-DU of the IAB-donor or another IAB-node, RRC functionality to connect to the IAB-donor CU, etc.

Editors’ note: Discussion needed if the MT part should be referred to as UE part.

### 4.x.2 IAB architecture and interfaces

The architecture for supporting IAB is shown in Figure 4.x.2-1.

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- The IAB-node can only be connected to one IAB-donor CU-CP.

- Next-hop neighbours of an IAB-node are referred to as *northbound* if they are closer to the IAB-donor, or as *southbound* if they are further away from the IAB-donor.

- Northbound neighbours are also referred to as *parent nodes* and southbound neighbours as *child nodes*. The northbound neighbour (or parent node) of an IAB-node can be another IAB-node or the IAB-donor.

- IAB-node and IAB-donor can have multiple child nodes.

- an IAB-nodes can have multiple parent nodes.

Editors’ note: Discussion needed on the number of parent nodes supported.



**Figure 4.x.2-1: Overall IAB architecture; a) IAB-node using SA mode with NGC; b) IAB-node using NSA mode with EPC**

The IAB-node terminates the gNB-DU part of the F1-C and F1-U interfaces.. The IAB-node’s gNB-DU function, together with the gNB-CU on the IAB-donor, provide NR access to UEs and child IAB-nodes in southbound direction.

The IAB-node also terminates a subset of the NR Uu radio interface (MT part) to access the network in northbound direction. The IAB-node can access the network using either NR SA-mode or NR NSA-mode (i.e. EN-DC). In NSA-mode, the IAB-node also connects via LTE to a MeNB, and the IAB-donor terminates X2-C as SgNB.

The IAB-node terminates the IP transport and is reachable from the operator’s transport network via the DU part of the IAB-Donor. The IAB node and the CU (CU-CP and CU-UP) of the Donor gNB communicate with each other using IP as for CU/DU transport connections on wireline networks. In the downlink, the IAB-Donor DU performs mapping of IP packets destined for the IAB-node to southbound NR backhaul RLC-channels while in the uplink the IAB-node performs mapping of IP packets destined for the operator transport network to northbound RLC-channels. The mapping may be based on Diffserv Codepoints (DSCP), IPv6 flow label, as well as other QoS information about the UE bearers transported via the NR backhaul. The IAB Adaptation Layer (IAL) protocol, which resides above the RLC layer, is used at the IAB nodes and the DU part of the IAB-donor to support forwarding across the-IAB network. In case of multi-hop deployments, the forwarding of packets in the intermediate IAB nodes is done based on information carried in the IAL protocol and configuration received from the gNB-CU functionality of the Donor gNB that sets up the mapping/forwarding rules/tables.

Editor’s note: The term “IAB-Adaptation Layer (IAL)” is preliminary and may be replaced.

NOTE: The IAL protocol is specified in 3GPP TS 38.3xx [x]The security mechanism for protecting F1 interface as defined in 3GPP TS 33.501 [z] is also applicable for protecting F1 interface towards IAB nodes.

On the wireless backhaul interface, the CU-CP of the IAB-donor gNB will establish one or more backhaul (BH) RLC channels. The details on how F1-C and F1-U traffic may be mapped to the RLC channels and the procedures for setting up BH channels are further is described in 38.401[4].

The figures below show the protocol stacks for supporting the F1 interface to an IAB node (possibly connected via another IAB node) to an IAB-donor gNB.



Figure 4.x.2-2: Protocol stack for supporting F1-U



Figure 4.x.2-3: Protocol stack for supporting F1-C

4.x.5

### 4.x.6 Signaling procedures

#### 4.x.6.1 Signaling between IAB-node and IAB-donor

Signaling procedures between IAB-node and IAB-donor are described in 3GPP TS 38.401 [x].

#### 4.x.6.2 Release of soft resources

#### 4.x.6.3 Backhaul RLF notification



Figure 4.x.6.3: BH RLF notification

The IAB-node can inform a child node about upstream BH RLF via a BH RLF notification message. This allows the child node to take proactive measures for BH RLF recovery.

Editor’s note: BH RLF notification needs further discussion.

### 4.x.7 IAB-node OAM aspects

IAB-node OAM aspects are described in 3GPP TS 38.401 [x].

NEXT CHANGE

# 6 Layer 2

## 6.1 Overview

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## 6.x IAB Adaptation Protocol sublayer

Editor’s note: The term “IAB-Adaptation Layer (IAL)” is preliminary and may be replaced.

### 6.x.1 Services and Functions

The IAB adaptation sublayer is only supported on NR backhaul links. The main services and functions of the adaptation sublayer include:

- Marking of route information on Adaptation PDUs at the source node of the route,

- Forwarding of Adaptation PDUs across IAB topology on IAB-nodes and IAB-donor-DU based on route information,

- Mapping of Adaptation PDUs to backhaul RLC-channels.

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## 6.y Modification to Layer 2 for IAB

Figure 6.y-1 shows the DL L2 structure for the IAB-donor, and Fig. 6y-2 shows the DL L2 structure for the IAB-node.



Figure 6.y-1: DL L2-structure of IAB-donor



Figure 6.y-2: DL L2-structure of IAB-node

Editor’s note: These figures have been derived from TR 38.874. Some modifications have been made to better reflect the most recent decisions captured in TR 38.874 conclusions and WID. Further modifications may be necessary.

On the IAB-donor, IAB Adaptation Layer processing includes forwarding, marking of the PDU with a routing identifier, and mapping of the Adaptation PDU to an BH RLC channel.

On the IAB-node, IAB Adaptation layer processing includes forwarding and, potentially, re-mapping of the Adaptation PDU to an egress BH RLC channel.

END OF CHANGES