**3GPP TSG-RAN WG2 Meeting #111 Electronic *R2-200xxxx***

**Elbonia, 17 – 28 August 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** | **0383** | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *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:*** | Update to IAB-MT capabilities | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_IAB-Core | | | | |  | ***Date:*** | | | 2020-08 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | 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:*** | | During RAN#88e meeting the conclusions captured in RP-201292 were agreed and need to be reflected in TS 38.306.  Furthermore, RAN2#111-e meeting conclusions need to be reflected in TS 38.306. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. In section 4.2.9, it is clarified that *eventA-MeasAndReport* and *intraAndInterF-MeasAndReport* features are mandatory for an IAB-MT. 2. In section 4.2.9, it is clarified that *handoverInterF* feature applies differently for an IAB-MT. 3. Description in section 4.2.15.1 is updated to account for the change in bullet 3. 4. In section 4.2.15.7.2 editorial change is made to change *ul-flexibleDL-SlotFormatDynamic-IAB* to *ul-flexibleDL-SlotFormatDynamic****s****-IAB*, to align with 38.331.   **Impact analysis**  Impacted functionality: IAB-MT capability signalling.  Inter-operability:   1. If the IAB-DU/IAB-CU is implemented according to the CR and the IAB-MT is not, there are no interoperability issues 2. If the IAB-MT is implemented according to the CR and the IAB-DU/IAB-CU is not, there are no interoperability issues. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Signalling of mandatory UE features which are optional for IAB-MT becomes ambiguous without separate parameters for IAB-MT.  *eventA-MeasAndReport* and *intraAndInterF-MeasAndReport* remain optional for IAB-MTs, which is contradicotry to RAN#88e agreement. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.2.9, 4.2.15.1, 4.2.15.7 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*First Modified Subclause*

### 4.2.9 *MeasAndMobParameters*

| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| --- | --- | --- | --- | --- |
| ***cli-RSSI-Meas-r16***  Indicates whether the UE can perform CLI RSSI measurements as specified in TS 38.215 [13] and supports periodical reporting and measurement event triggering as specified in TS 38.331 [9]. If the UE supports this feature, the UE needs to report *maxNumberCLI-RSSI-r16*. | UE | No | TDD only | Yes |
| ***cli-SRS-RSRP-Meas-r16***  Indicates whether the UE can perform SRS RSRP measurements as specified in TS 38.215 [13] and supports periodical reporting and measurement event triggering based on SRS-RSRP as specified in TS 38.331 [9]. If the UE supports this feature, the UE needs to report *maxNumberCLI-SRS-RSRP-r16* and *maxNumberPerSlotCLI-SRS-RSRP-r16*. | UE | No | TDD only | Yes |
| ***condHandover-r16***  Indicates whether the UE supports conditional handover including execution condition, candidate cell configuration and maximum 8 candidate cells. | UE | No | Yes | Yes |
| ***condHandoverFailure-r16***  Indicates whether the UE supports conditional handover during re-establishment procedure when the selected cell is configured as candidate cell for condition handover. | UE | No | Yes | Yes |
| ***condHandoverFDD-TDD-r16***  Indicates whether the UE supports conditional handover between FDD and TDD cells. | UE | No | No | No |
| ***condHandoverFR1-FR2-r16***  Indicates whether the UE supports conditional handover HO between FR1 and FR2. | UE | No | No | No |
| ***condHandoverTwoTriggerEvents-r16***  Indicates whether the UE supports 2 trigger events for same execution condition. This feature is mandatory supported if the UE supports *condHandover-r16*. | UE | CY | Yes | Yes |
| ***csi-RS-RLM***  Indicates whether the UE can perform radio link monitoring procedure based on measurement of CSI-RS as specified in TS 38.213 [11] and TS 38.133 [5]. This parameter needs FR1 and FR2 differentiation. If the UE supports this feature, the UE needs to report *maxNumberResource-CSI-RS-RLM*. | UE | Yes | No | Yes |
| ***csi-RSRP-AndRSRQ-MeasWithSSB***  Indicates whether the UE can perform CSI-RSRP and CSI-RSRQ measurement as specified in TS 38.215 [13], where CSI-RS resource is configured with an associated SS/PBCH. If this parameter is indicated for FR1 and FR2 differently, each indication corresponds to the frequency range of measured target cell. If the UE supports this feature, the UE needs to report *maxNumberCSI-RS-RRM-RS-SINR*. | UE | No | No | Yes |
| ***csi-RSRP-AndRSRQ-MeasWithoutSSB***  Indicates whether the UE can perform CSI-RSRP and CSI-RSRQ measurement as specified in TS 38.215 [13], where CSI-RS resource is configured for a cell that transmits SS/PBCH block and without an associated SS/PBCH block. If this parameter is indicated for FR1 and FR2 differently, each indication corresponds to the frequency range of measured target cell. If the UE supports this feature, the UE needs to report *maxNumberCSI-RS-RRM-RS-SINR*. | UE | No | No | Yes |
| ***csi-SINR-Meas***  Indicates whether the UE can perform CSI-SINR measurements based on configured CSI-RS resources as specified in TS 38.215 [13]. If this parameter is indicated for FR1 and FR2 differently, each indication corresponding to the frequency range of measured target cell. If the UE supports this feature, the UE needs to report *maxNumberCSI-RS-RRM-RS-SINR*. | UE | No | No | Yes |
| ***eutra-AutonomousGaps-r16***  Defines whether the UE supports, upon configuration of *useAutonomousGaps* by the network, acquisition of relevant information from a neighbouring E-UTRA cell by reading the SI of the neighbouring cell using autonomous gap and reporting the acquired information to the network as specified in TS 38.331 [9] when MR-DC is not configured. | UE | No | Yes | No |
| ***eutra-CGI-Reporting***  Defines whether the UE supports acquisition of relevant CGI-information from a neighbouring E-UTRA cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when the (NG)EN-DC and NE-DC are not configured or, when consistent DRX is configured in NR-DC. The consistent DRX configuration implies that MN and SN have the same DRX cycle and on-duration configured by MN completely contains on-duration configured by SN. It is mandated if the UE supports EUTRA. | UE | CY | No | No |
| ***eutra-CGI-Reporting-NEDC***  Defines whether the UE supports acquisition of relevant information from a neighbouring E-UTRA cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when theNE-DCis configured. | UE | No | No | No |
| ***eutra-CGI-Reporting-NRDC***  Defines whether the UE supports acquisition of relevant information from a neighbouring E-UTRA cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when theNR-DC is configured wherein MN and SN have different DRX cycles, or on-duration configured by MN does not contain on-duration configured by SN if the DRX cycles are the same. | UE | No | No | No |
| ***eventA-MeasAndReport***  Indicates whether the UE supports NR measurements and events A triggered reporting as specified in TS 38.331 [9].This field only applies to SN configured measurement when (NG)EN-DC is configured. For NR MCG, this feature is mandatory supported.  For IAB-MT, indicates whether the IAB-MT supports NR measurements and events A triggered reporting as specified in TS 38.331 [9]. | UE | Yes | Yes | No |
| ***eventB-MeasAndReport***  Indicates whether the UE supports EUTRA measurement and event B triggered reporting as specified in TS 38.331 [9]. It is mandated if the UE supports EUTRA. | UE | CY | No | No |
| ***handoverLTE-5GC***  Indicates whether the UE supports HO to EUTRA connected to 5GC. It is mandated if the UE supports EUTRA connected to 5GC. | UE | CY | Yes | Yes |
| ***handoverFDD-TDD***  Indicates whether the UE supports HO between FDD and TDD. It is mandated if the UE supports both FDD and TDD. This field only applies to NR SA/NR-DC/NE-DC (e.g. PCell handover). For PSCell change when (NG)EN-DC/NR-DC is configured, this feature is mandatory supported. | UE | Yes | No | No |
| ***handoverFR1-FR2***  Indicates whether the UE supports HO between FR1 and FR2. Support is mandatory for the UE supporting both FR1 and FR2. This field only applies to NR SA/NR-DC/NE-DC (e.g. PCell handover). For PSCell change when (NG)EN-DC/NR-DC is configured, this feature is mandatory supported. | UE | Yes | No | No |
| ***handoverInterF***  Indicates whether the UE supports inter-frequency HO. It indicates the support for inter-frequency HO from the corresponding duplex mode if this capability is included in *fdd-Add-UE-NR-Capabilities* or *tdd-Add-UE-NR-Capabilities*. It indicates the support for inter-frequency HO from the corresponding frequency range if this capability is included in *fr1-Add-UE-NR-Capabilities* or *fr2-Add-UE-NR-Capabilities*. This field only applies to NR SA/NR-DC/NE-DC (e.g. PCell handover). For PSCell change when EN-DC/NR-DC is configured, this feature is mandatory supported.  For IAB-MT, indicates whether the IAB-MT supports inter-frequency HO. It indicates the support for inter-frequency HO from the corresponding duplex mode if this capability is included in *fdd-Add-UE-NR-Capabilities* or *tdd-Add-UE-NR-Capabilities*. It indicates the support for inter-frequency HO from the corresponding frequency range if this capability is included in *fr1-Add-UE-NR-Capabilities* or *fr2-Add-UE-NR-Capabilities*. | UE | Yes | Yes | Yes |
| ***handoverLTE-EPC***  Indicates whether the UE supports HO to EUTRA connected to EPC. It is mandated if the UE supports EUTRA connected to EPC. | UE | CY | Yes | Yes |
| ***handoverUTRA-FDD-r16***  Indicates whether the UE supports NR to UTRA-FDD CELL\_DCH CS handover. It is mandatory to support both UTRA-FDD measurement and event B triggered reporting, and periodic UTRA-FDD measurement and reporting if the UE supports HO to UTRA-FDD. If this field is included, then UE shall support IMS voice over NR. | UE | No | Yes | Yes |
| ***idleInactiveNR-MeasReport-r16***  Indicates whether the UE supports configuration of NR SSB measurements in RRC\_IDLE/RRC\_INACTIVE and reporting of the corresponding results upon network request as specified in TS 38.331 [9]. | UE | No | No | Yes |
| ***idleInactiveEUTRA-MeasReport-r16***  Indicates whether the UE supports configuration of E-UTRA measurements in RRC\_IDLE/RRC\_INACTIVE and reporting of the corresponding results upon network request as specified in TS 38.331 [9]. | UE | No | No | No |
| ***idleInactive-ValidityArea-r16***  Indicates whether the UE supports configuration of a validity area for NR measurements in RRC\_IDLE/RRC\_INACTIVE as specified in TS 38.331 [9]. | UE | No | No | No |
| ***independentGapConfig***  This field indicates whether the UE supports two independent measurement gap configurations for FR1 and FR2 specified in clause 9.1.2 of TS 38.133 [5]. The field also indicates whether the UE supports the FR2 inter-RAT measurement without gaps when (NG)EN-DC is not configured. | UE | No | No | No |
| ***intraAndInterF-MeasAndReport***  Indicates whether the UE supports NR intra-frequency and inter-frequency measurements and at least periodical reporting. This field only applies to NE-DC and SN configured measurement when (NG)EN-DC is configured. For NR MCG, this feature is mandatory supported.  For IAB-MT, indicates whether the IAB-MT supports NR intra-frequency and inter-frequency measurements and at least periodical reporting. | UE | Yes | Yes | No |
| ***interFrequencyMeas-NoGap-r16***  Indicates whether the UE can perform inter-frequency SSB based measurements without measurement gaps if the SSB is completely contained in the active BWP of the UE as specified in TS 38.133 [5]. | UE | No | No | Yes |
| ***periodicEUTRA-MeasAndReport***  Indicates whether the UE supports periodic EUTRA measurement and reporting. It is mandated if the UE supports EUTRA. | UE | CY | No | No |
| ***maxNumberCLI-RSSI-r16***  Defines the maximum number of CLI-RSSI measurement resources for CLI RSSI measurement. If the UE supports cli-RSSI-Meas-r16, the UE shall report this capability. | UE | CY | TDD only | No |
| ***maxNumberCLI-SRS-RSRP-r16***  Defines the maximum number of SRS-RSRP measurement resources for SRS-RSRP measurement. If the UE supports cli-SRS-RSRP-Meas-r16, the UE shall report this capability. | UE | CY | TDD only | No |
| ***maxNumberCSI-RS-RRM-RS-SINR***  Defines the maximum number of CSI-RS resources for RRM and RS-SINR measurement across all measurement frequencies per slot. If UE supports any of *csi-RSRP-AndRSRQ-MeasWithSSB*, *csi-RSRP-AndRSRQ-MeasWithoutSSB*, and *csi-SINR-Meas*, UE shall report this capability. | UE | CY | No | No |
| ***maxNumberPerSlotCLI-SRS-RSRP-r16***  Defines the maximum number of SRS-RSRP measurement resources per slot for SRS-RSRP measurement. If the UE supports *cli-SRS-RSRP-Meas-r16*, the UE shall report this capability. | UE | CY | TDD only | No |
| ***maxNumberResource-CSI-RS-RLM***  Defines the maximum number of CSI-RS resources within a slot per spCell for CSI-RS based RLM. If UE supports any of *csi-RS-RLM* and *ssb-AndCSI-RS-RLM*, UE shall report this capability. | UE | CY | No | Yes |
| ***nr-AutonomousGaps-r16***  Defines whether the UE supports, upon configuration of *useAutonomousGaps* by the network, acquisition of relevant information from a neighbouring NR cell by reading the SI of the neighbouring cell using autonomous gap and reporting the acquired information to the network as specified in TS 38.331 [9] when MR-DC is not configured. | UE | No | Yes | Yes |
| ***nr-AutonomousGapsENDC-r16***  Defines whether the UE supports, upon configuration of *useAutonomousGaps* by the network, acquisition of relevant information from a neighbouring NR cell by reading the SI of the neighbouring cell using autonomous gap and reporting the acquired information to the network as specified in TS 38.331 [9] when (NG)EN-DC is configured. | UE | No | Yes | Yes |
| ***nr-AutonomousGapsNEDC-r16***  Defines whether the UE supports, upon configuration of *useAutonomousGaps* by the network, acquisition of relevant information from a neighbouring NR cell by reading the SI of the neighbouring cell using autonomous gap and reporting the acquired information to the network as specified in TS 38.331 [9] when NE-DC is configured. | UE | No | Yes | Yes |
| ***nr-AutonomousGapsNRDC-r16***  Defines whether the UE supports, upon configuration of *useAutonomousGaps* by the network, acquisition of relevant information from a neighbouring NR cell by reading the SI of the neighbouring cell using autonomous gap and reporting the acquired information to the network as specified in TS 38.331 [9] when NR-DC is configured. | UE | No | Yes | Yes |
| ***nr-CGI-Reporting***  Defines whether the UE supports acquisition of relevant CGI-information from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when (NG)EN-DC and NE-DC are not configured or, when consistent DRX is configured in NR-DC. The consistent DRX configuration implies that MN and SN have the same DRX cycle and on-duration configured by MN completely contains on-duration configured by SN. | UE | Yes | No | No |
| ***nr-CGI-Reporting-ENDC***  Defines whether the UE supports acquisition of relevant CGI-information from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when the (NG)EN-DC is configured. | UE | Yes | No | No |
| ***reportAddNeighMeasForPeriodic-r16***  Defines whether the UE supports periodic reporting of best neighbour cells per serving frequency, as defined in TS 38.331 [9]. | UE | Yes | No | No |
| ***nr-CGI-Reporting-NEDC***  Defines whether the UE supports acquisition of relevant information from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when the NE-DC is configured. | UE | Yes | No | No |
| ***nr-CGI-Reporting-NPN-r16***  Defines whether the UE supports acquisition of NPN-relevant CGI-information from a neighbouring intra-frequency or inter-frequency NR NPN cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9]. If UE supports NPN, UE shall report this capability. | UE | CY | No | No |
| ***nr-CGI-Reporting-NRDC***  Defines whether the UE supports acquisition of relevant information from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired information to the network as specified in TS 38.331 [9] when the NR-DC is configured wherein MN and SN have different DRX cycles, or on-duration configured by MN does not contain on-duration configured by SN if the DRX cycles are the same. | UE | Yes | No | No |
| ***nr-NeedForGap-Reporting-r16***  Indicates whether the UE supports reporting the measurement gap requirement information for NR target in the UE response to a network configuration RRC message. | UE | No | No | No |
| ***pcellT312-r16***  Indicates whether the UE supports T312 based fast failure recovery for PCell. | UE | No | Yes | Yes |
| ***simultaneousRxDataSSB-DiffNumerology***  Indicates whether the UE supports concurrent intra-frequency measurement on serving cell or neighbouring cell and PDCCH or PDSCH reception from the serving cell with a different numerology as defined in clause 8 and 9 of TS 38.133 [5]. | UE | No | No | Yes |
| ***simultaneousRxDataSSB-DiffNumerology-Inter-r16***  Indicates whether the UE supports concurrent SSB based inter-frequency measurement without measurement gap on neighbouring cell and PDCCH or PDSCH reception from the serving cell with a different numerology as defined in clause 8 and 9 of TS 38.133 [5]. | UE | No | No | Yes |
| ***sftd-MeasPSCell***  Indicates whether the UE supports SFTD measurements between the PCell and a configured PSCell. If this capability is included in UE-MRDC-Capability, it indicates that the UE supports SFTD measurement between PCell and PSCell in (NG)EN-DC. If this capability is included in UE-NR-Capability, it indicates that the UE supports SFTD measurement between PCell and PSCell in NR-DC. | UE | No | Yes | No |
| ***sftd-MeasPSCell-NEDC***  Indicates whether the UE supports SFTD measurement between the NR PCell and a configured E-UTRA PSCell in NE-DC. | UE | No | Yes | No |
| ***sftd-MeasNR-Cell***  Indicates whether the SFTD measurement with and without measurement gaps between the EUTRA PCell and the NR cells is supported by the UE which is capable of EN-DC/NGEN-DC when EN-DC/NGEN-DC is not configured. The SFTD measurement without gaps can be used when the UE supports at least one EN-DC band combination consisting of the set of the current E-UTRA serving frequencies and the NR frequency where SFTD measurement is configured. In UE-NR-Capability, this field is not used, and UE does not include the field. | UE | No | Yes | No |
| ***sftd-MeasNR-Neigh***  Indicates whether the inter-frequency SFTD measurement with and without measurement gaps between the NR PCell and inter-frequency NR neighbour cells is supported by the UE when MR-DC is not configured. The SFTD measurement without gaps can be used when the UE supports at least one DC or CA band combination consisting of the set of the current NR serving frequencies and the NR frequency where SFTD measurement is configured. | UE | No | Yes | No |
| ***sftd-MeasNR-Neigh-DRX***  Indicates whether the inter-frequency SFTD measurement using DRX off period between the NR PCell and the inter-frequency NR neighbour cells is supported by the UE when MR-DC is not configured. | UE | No | Yes | No |
| ***ssb-RLM***  Indicates whether the UE can perform radio link monitoring procedure based on measurement of SS/PBCH block as specified in TS 38.213 [11] and TS 38.133 [5]. This field shall be set to *supported*. | UE | Yes | No | No |
| ***ssb-AndCSI-RS-RLM***  Indicates whether the UE can perform radio link monitoring procedure based on measurement of SS/PBCH block and CSI-RS as specified in TS 38.213 [11] and TS 38.133 [5]. If the UE supports this feature, the UE needs to report *maxNumberResource-CSI-RS-RLM*. | UE | No | No | No |
| ***ss-SINR-Meas***  Indicates whether the UE can perform SS-SINR measurement as specified in TS 38.215 [13]. If this parameter is indicated for FR1 and FR2 differently, each indication corresponds to the frequency range of measured target cell. | UE | No | No | Yes |
| ***supportedGapPattern***  Indicates measurement gap pattern(s) optionally supported by the UE for NR SA, for NR-DC, for NE-DC and for independent measurement gap configuration on FR2 in (NG)EN-DC. The leading / leftmost bit (bit 0) corresponds to the gap pattern 2, the next bit corresponds to the gap pattern 3, as specified in TS 38.133 [5] and so on. The UE shall set the bits corresponding to the measurement gap pattern 13, 14, 17, 18 and 19 to 1 if the UE is an NR standalone capable UE that supports a band in FR2 or if the UE is an (NG)EN-DC capable UE that supports *independentGapConfig* and supports a band in FR2. | UE | CY | No | No |
| ***supportedGapPattern-NRonly***  Indicates measurement gap pattern(s) optionally supported by the UE for NR SA and NR-DC when the frequencies to be measured within this measurement gap are all NR frequencies. The leading / leftmost bit (bit 0) corresponds to the gap pattern 2, the next bit corresponds to the gap pattern 3 and so on. The UE shall set the bits corresponding to the measurement gap pattern 2, 3 and 11 to 1. | UE | FD | No | No |
| ***supportedGapPattern-NRonly-NEDC***  Indicates whether the UE supports gap patterns 2, 3 and 11 in NE-DC when the frequencies to be measured within this measurement gap are all NR frequencies. | UE | No | No | No |

*Next Modified Subclause*

### 4.2.15 IAB Parameters

#### 4.2.15.1 Mandatory IAB-MT features

Table 4.2.11.1-1, Table 4.2.11.1-2 and Table 4.2.11.1-3 capture feature groups, which are mandatory for an IAB-MT. All other feature groups or components of the feature groups as captured in TR 38.822 [24] as well as capabilities specified in this specification are optional for an IAB-MT, unless indicated otherwise.

Table 4.2.15.1-1: Layer-1 mandatory features for IAB-MT

| Features | Index | Feature group | Components | Additional information |
| --- | --- | --- | --- | --- |
| 0. Waveform, modulation, subcarrier spacings, and CP | 0-1 | CP-OFDM waveform for DL and UL | 1) CP-OFDM for DL  2) CP -OFDM for UL |  |
| 0-3 | DL modulation scheme | 1) QPSK modulation  2) 16QAM modulation  3) 64QAM modulation for FR1 |  |
| 0-4 | UL modulation scheme | 1) QPSK modulation  2) 16QAM modulation |  |
| 1. Initial access and mobility | 1-1 | Basic initial access channels and procedures | 1) RACH preamble format  2) SS block based RRM measurement  3) Broadcast SIB reception including RMSI/OSI and paging | Only 1 preamble for component 1), component 2), component 3) except paging |
| 1-3 | SS block based RLM | SS-SINR measurement |  |
| 2. MIMO | 2-1 | Basic PDSCH reception | 1) Data RE mapping  2) Single layer transmission  3) Support one TCI state |  |
| 2-5 | Basic downlink DMRS  for scheduling type A | 1) Support 1 symbol FL DMRS without additional symbol(s)  2) Support 1 symbol FL DMRS and 1 additional DMRS symbol  3) Support 1 symbol FL DMRS and 2 additional DMRS symbols for at least one port. |  |
| 2-6 | Basic downlink DMRS  for scheduling type B | 1) Support 1 symbol FL DMRS without additional symbol(s)  2) Support 1 symbol FL DMRS and 1 additional DMRS symbol |  |
| 2-12 | Basic PUSCH transmission | Data RE mapping  Single layer (single Tx) transmission  Single port, single resource SRS transmission (SRS set use is configured as for codebook) |  |
| 2-16 | Basic uplink DMRS (uplink) for scheduling type A | 1) Support 1 symbol FL DMRS without additional symbol(s)  2) Support 1 symbol FL DMRS and 1 additional DMRS symbols  3) Support 1 symbol FL DMRS and 2 additional DMRS symbols |  |
| 2-16a | Basic uplink DMRS  for scheduling type B | 1) Support 1 symbol FL DMRS without additional symbol(s)  2) Support 1 symbol FL DMRS and 1 additional DMRS symbol |  |
| 2-22 | Aperiodic beam report | Support aperiodic report on PUSCH |  |
| 2-32 | Basic CSI feedback | 1) Type I single panel codebook based PMI (further discuss which mode or both to be supported as mandatory)  2) 2Tx codebook for FR1 and FR2  3) 4Tx codebook for FR1  4) 8Tx codebook for FR1 when configured as wideband CSI report  7) a-CSI on PUSCH (at least Z value >= 14 symbols, detail processing time to be discussed separately)  further check a-CSI on p-CSI-RS and/or SP-CSI-RS from component-7 |  |
| 2-50 | Basic TRS | 1) Support of TRS (mandatory)  2) All the periodicity are supported. |  |
| 2-52 | Basic SRS | 1) Support 1 port SRS transmission  2) Support periodic/aperiodic SRS transmission |  |
| 3. DL control channel and procedure | 3-1 | Basic DL control channel | 1) One configured CORESET per BWP per cell in addition to CORESET0  - CORESET resource allocation of 6RB bit-map and duration of 1 – 3 OFDM symbols for FR1  - For type 1 CSS without dedicated RRC configuration and for type 0, 0A, and 2 CSSs, CORESET resource allocation of 6RB bit-map and duration 1-3 OFDM symbols for FR2  - For type 1 CSS with dedicated RRC configuration and for type 3 CSS, UE specific SS, CORESET resource allocation of 6RB bit-map and duration 1-2 OFDM symbols for FR2  - REG-bundle sizes of 2/3 RBs or 6 RBs  - Interleaved and non-interleaved CCE-to-REG mapping  - Precoder-granularity of REG-bundle size  - PDCCH DMRS scrambling determination  - TCI state(s) for a CORESET configuration  2) CSS and UE-SS configurations for unicast PDCCH transmission per BWP per cell  - PDCCH aggregation levels 1, 2, 4, 8, 16  - UP to 3 search space sets in a slot for a scheduled SCell per BWP  This search space limit is before applying all dropping rules.  - For type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS, the monitoring occasion is within the first 3 OFDM symbols of a slot  - For type 1 CSS without dedicated RRC configuration and for type 0, 0A, and 2 CSS, the monitoring occasion can be any OFDM symbol(s) of a slot, with the monitoring occasions for any of Type 1- CSS without dedicated RRC configuration, or Types 0, 0A, or 2 CSS configurations within a single span of three consecutive OFDM symbols within a slot  3) Monitoring DCI formats 0\_0, 1\_0, 0\_1, 1\_1  4) Number of PDCCH blind decodes per slot with a given SCS follows Case 1-1 table  5) Processing one unicast DCI scheduling DL and one unicast DCI scheduling UL per slot per scheduled CC for FDD |  |
| 4. UL control channel and procedure | 4-1 | Basic UL control channel | 1) PUCCH format 0 over 1 OFDM symbols once per slot  2) PUCCH format 0 over 2 OFDM symbols once per slot with frequency hopping as "enabled"  3) PUCCH format 1 over 4 – 14 OFDM symbols once per slot with intra-slot frequency hopping as "enabled"  5) One SR configuration per PUCCH group  6) HARQ-ACK transmission once per slot with its resource/timing determined by using the DCI  7)  SR/HARQ multiplexing once per slot using a PUCCH when SR/HARQ-ACK are supposed to be sent by overlapping PUCCH resources with the same starting symbols in a slot  8) HARQ-ACK piggyback on PUSCH with/without aperiodic CSI once per slot when the starting OFDM symbol of the PUSCH is the same as the starting OFDM symbols of the PUCCH resource that HARQ-ACK would have been transmitted on  9) Semi-static beta-offset configuration for HARQ-ACK  10) Single group of overlapping PUCCH/PUCCH and overlapping PUCCH/PUSCH s per slot per PUCCH cell group for control multiplexing |  |
| 4-10 | Dynamic HARQ-ACK codebook | Dynamic HARQ-ACK codebook |  |
| 5. Scheduling/HARQ operation | 5-1 | Basic scheduling/HARQ operation | 1) Frequency-domain resource allocation  - RA Type 0 only and Type 1 only for PDSCH without interleaving  - RA Type 1 for PUSCH without interleaving  2) Time-domain resource allocation  - 1-14 OFDM symbols for PUSCH once per slot  - One unicast PDSCH per slot  - Starting symbol, and duration are determined by using the DCI  - PDSCH mapping type A with 7-14 OFDM symbols  - PUSCH mapping type A and type B  - For type 1 CSS without dedicated RRC configuration and for type 0, 0A, and 2 CSS, PDSCH mapping type A with {4-14} OFDM symbols and type B with {2, 4, 7} OFDM symbols  3) TBS determination  4) Nominal UE processing time for N1 and N2 (Capability #1)  5) HARQ process operation with configurable number of DL HARQ processes of up to 16  6) Cell specific RRC configured UL/DL assignment for TDD  7) Dynamic UL/DL determination based on L1 scheduling DCI with/without cell specific RRC configured UL/DL assignment  9) In TDD support at most one switch point per slot for actual DL/UL transmission(s)  10) DL scheduling slot offset K0=0  12) UL scheduling slot offset K2<=12  For type 1 CSS without dedicated RRC configuration and for type 0, 0A, and 2 CSS, interleaving for VRB-to-PRB mapping for PDSCH |  |
| 6. CA/DC, BWP, SUL | 6-1 | Basic BWP operation with restriction | 1) 1 UE-specific RRC configured DL BWP per carrier  2) 1 UE-specific RRC configured UL BWP per carrier  3) RRC reconfiguration of any parameters related to BWP  4) BW of a UE-specific RRC configured BWP includes BW of CORESET#0 (if CORESET#0 is present) and SSB for PCell/PSCell (if configured) and BW of the UE-specific RRC configured BWP includes SSB for SCell if there is SSB on SCell |  |
| 7. Channel coding | 7-1 | Channel coding | 1) LDPC encoding and associated functions for data on DL and UL  2) Polar encoding and associated functions for PBCH, DCI, and UCI  3) Coding for very small blocks |  |
| 8. UL TPC | 8-3 | Basic power control operation | 1) Accumulated power control mode for closed loop  2) 1 TPC command loop for PUSCH, PUCCH respectively  3) One or multiple DL RS configured for pathloss estimation  4) One or multiple p0-alpha values configured for open loop PC  5) PUSCH power control  6) PUCCH power control  7) PRACH power control  8) SRS power control  9) PHR |  |

Table 4.2.15.1-2: Layer-2 and Layer-3 mandatory features for IAB-MT

| Features | Index | Feature group | Components | Additional information |
| --- | --- | --- | --- | --- |
| 0. General | N/A | IAB procedures | 1) Routing using BAP protocol, as specified in TS 38.340 [23]  2) Bearer mapping using BAP protocol, as specified in TS 38.340 [23]  3) IAB-node IP address signalling over RRC, as specified in TS 38.331 [9] |  |
| 1. PDCP | 1-0 | Basic PDCP procedures | 1) (de)Ciphering on SRB  2) Integrity protection on SRB  3) Timer based SDU discard  4) Re-ordering and in-order delivery  6) Duplicate discarding  7) 18bits SN |  |
| 2. RLC | 2-0 | Basic RLC procedures | 1) RLC TM  2) RLC AM with 18bits SN  3) SDU discard |  |
| 2-4 | NR RLC SN size for SRB | NR RLC SN size for SRB |  |
| 3. MAC | 3-0 | Basic MAC procedures | 1) RA procedure on PCell  2) IAB-MT initiated RA procedure (including for beam recovery purpose)  3) NW initiated RA procedure (i.e. based on PDCCH)  4) Support of ssb-Threshold and association between preamble/PRACH occasion and SSB  5) Preamble grouping  6) UL single TA maintenance  7) HARQ operation for DL and UL  8) LCH prioritization  9) Prioritized bit rate  10) Multiplexing  11) SR with single SR configuration  12) BSR  13) PHR  14) 8bits and 16bits L field |  |
| 9. RRC | 9-1 | RRC buffer size | Maximum overall RRC configuration size | 45 Kbytes |
| 9-2 | RRC processing time | 1) RRC connection establishment  2) RRC connection resume without SCell addition/release and SCG establishment/modification/release  3) RRC connection reconfiguration without SCell addition/release and SCG establishment/modification/release  4) RRC connection re-establishment.  5) RRC connection reconfiguration with sync procedure  6) RRC connection reconfiguration with SCell addition/release or SCG establishment/modification/release  7) RRC connection resume  8) Initial security activation  9) Counter check  10) UE capability transfer | 1) to 3) 10ms  4) 10ms  5): 10ms + additional delay (cell search time and synchronization) defined in TS 38.133  6) and 7) 16ms  7) 10 or 6ms  (See details in clause 12, TS 38.331)  8) and 9) 5ms  10) 80ms |

Table 4.2.11.1-3: RF/RRM mandatory features for IAB-MT

| Features | Index | Feature group | Components | Additional information |
| --- | --- | --- | --- | --- |
| 1. System parameter | 1-2 | 64QAM modulation for FR2 PDSCH | 64QAM modulation for FR2 PDSCH |  |
| 1-3 | 64QAM for PUSCH | 64QAM for PUSCH |  |

*Next Modified Subclause*

#### 4.2.15.7 Physical layer parameters

##### 4.2.15.7.1 BandNR parameters

| Definitions for parameters | Per | M | FDD-TDD  DIFF | FR1-FR2  DIFF |
| --- | --- | --- | --- | --- |
| ***multipleTCI***  Indicates whether UE supports more than one TCI state configurations per CORESET. UE is only required to track one active TCI state per CORESET. UE is required to support minimum between 64 and number of configured TCI states indicated by *tci-StatePDSCH*. | Band | No | N/A | N/A |
| ***rasterShift7dot5-IAB-r16***  Indicates whether the IAB-MT supports 7.5kHz UL raster shift in the indicated band. | Band | No | No | No |

##### 4.2.15.7.2 Phy-Parameters

| Definitions for parameters | | Per | M | FDD-TDD  DIFF | | FR1-FR2  DIFF |
| --- | --- | --- | --- | --- | --- | --- |
| ***dft-S-OFDM-WaveformUL-IAB-r16***  Indicates whether the IAB-MT supports DFT-S-OFDM waveform for UL and transform precoding for single-layer PUSCH. | | IAB-MT | No | No | | No |
| ***dci-25-AI-RNTI-Support-IAB-r16***  Indicates the support of monitoring DCI Format 2\_5 scrambled by AI-RNTI for indication of soft resource availability to an IAB node as specified in TS 38.212 [10]. | IAB-MT | | No | No | No | |
| ***guardSymbolReportReception-IAB-r16***  Indicates the support of DesiredGuardSymbols reporting and ProvidedGuardSymbols reception as specified in TS 38.213 [11]. | IAB-MT | | No | No | No | |
| ***pdsch-MappingTypeA***  Indicates whether the IAB-MT supports receiving PDSCH using PDSCH mapping type A with less than seven symbols. | IAB-MT | | No | No | No | |
| ***pucch-F2-WithFH***  Indicates whether the UE supports transmission of a PUCCH format 2 (2 OFDM symbols in total) with frequency hopping in a slot. | IAB-MT | | No | No | Yes | |
| ***pucch-F3-WithFH***  Indicates whether the UE supports transmission of a PUCCH format 3 (4~14 OFDM symbols in total) with frequency hopping in a slot. | IAB-MT | | No | No | Yes | |
| ***seperateSMTC-InterIAB-Support-r16***  Indicates the support of up to 4 SMTCs configurations per frequency location, including IAB-specific SMTC window periodicities. | IAB-MT | | No | No | No | |
| ***seperateRACH-IAB-Support-r16***  Indicates the support of separate RACH configurations including new IAB-specific offset and scaling factors. | IAB-MT | | No | No | No | |
| ***t-DeltaReceptionSupport-IAB-r16***  Indicates the support of T\_delta reception for case 1 OTA timing alignment as specified in TS 38.213 [11]. | IAB-MT | | No | No | No | |
| ***ul-flexibleDL-SlotFormatSemiStatic-IAB-r16***  Indicates the support of semi-static configuration/indication of UL-Flexible-DL slot formats for IAB-MT resources. | IAB-MT | | No | No | No | |
| ***ul-flexibleDL-SlotFormatDynamics-IAB-r16***  Indicates the support of dynamic indication of UL-Flexible-DL slot formats for IAB-MT resources. | IAB-MT | | No | No | No | |

*Next Modified Subclause*

#### 4.2.15.8 MeasAndMobParameters Parameters

| Definitions for parameters | Per | M | FDD-TDD  DIFF | FR1-FR2  DIFF |
| --- | --- | --- | --- | --- |
| eventA-MeasAndReport  Indicates whether the IAB-MT supports NR measurements and events A triggered reporting as specified in TS 38.331 [9]. | IAB-MT | Yes | Yes | No |
| ***handoverIntraF-IAB-r16***  Indicates whether the IAB-MT supports intra-frequency HO. It indicates the support for intra-frequency HO from the corresponding duplex mode if this capability is included in *fdd-Add-UE-NR-Capabilities* or *tdd-Add-UE-NR-Capabilities*. It indicates the support for intra-frequency HO in the corresponding frequency range if this capability is included in *fr1-Add-UE-NR-Capabilities* or *fr2-Add-UE-NR-Capabilities*. | IAB-MT | No | Yes | Yes |
| ***handoverInterF***  Indicates whether the IAB-MT supports inter-frequency HO. It indicates the support for inter-frequency HO from the corresponding duplex mode if this capability is included in fdd-Add-UE-NR-Capabilities or tdd-Add-UE-NR-Capabilities. It indicates the support for inter-frequency HO from the corresponding frequency range if this capability is included in fr1-Add-UE-NR-Capabilities or fr2-Add-UE-NR-Capabilities. | IAB-MT | No | Yes | Yes |
| ***mfbi-IAB-r16***  Indicates whether the IAB-MT supports multiple frequency band indication. | IAB-MT | No | No | No |
| ***multipleNS-And-Pmax-IAB-r16***  Indicates whether the IAB-MT supports multiple NS/P-Max. | IAB-MT | No | No | No |
| ***intraAndInterF-MeasAndReport***  Indicates whether the IAB-MT supports NR intra-frequency and inter-frequency measurements and at least periodical reporting. | IAB-MT | Yes | Yes | No |
| ***intraAndInterF-MeasAndReport***  Indicates whether the UE supports NR intra-frequency and inter-frequency measurements and at least periodical reporting. | IAB-MT | Yes | Yes | No |

*End of changes*