**3GPP TSG-RAN WG2 Meeting #109 electronic R2-200xxxx**

**Elbonia, 24 Feb – 6 Mar 2020**

**Agenda item: 7.3.2.2.3**

**Source: Intel Corporation**

**Title: Report of [AT109e][211][MOB] UE capabilities for DAPS and CHO (Intel)**

**Document for: Discussion and Decision**

# Introduction

This is the email discussion report on below email discussion:

* [AT109e][211][MOB] UE capabilities for DAPS and CHO (Intel)

Scope:

* + - Agreeing on the proposals as per 108#45 outcome in [R2-2000459](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109_e/Docs/R2-2000459.zip) and [R2-2002101](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109_e/Docs/R2-2002101.zip).
		- Discuss open items as per [R2-2002101](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_109_e/Docs/R2-2002101.zip) to seek companies feedback on open issues of UE capabilities for DAPS.

 Intended outcome:

* + - List of basic UE capabilities for DAPS and CHO,including basic ASN.1 structure (if possible)
		- List of remaining open issues for UE capabilities (e.g. topics dependent on other WG input)
		- If needed, draft LS to be sent to RAN1/4 containing RAN2 decisions on UE capabilities

 Deadline for providing comments and for rappporteur inputs:

* + - Companies input: Thursday, Feb. 27th 3:00 CET
		- Rapporteur proposals: Friday, Feb. 28th 12:00 CET
		- Comments on proposals: Monday March 2nd by 17:00 CET

# Discussion-Capability design

### 2.1 Agreements proposed to be agreed in this meeting (from all sub-topics)

As proposed in [13], below proposal is considered as easy agreement.

## RAN2 UE feature list on NR mobility enhancement

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Need for the gNB to know if the feature is supported | Applicable to the capability signalling exchange between UEs (V2X WI only)”. | **Consequence if the feature is not supported by the UE** | **Type****(the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)** | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Capability interpretation for mixture of FDD/TDD and/or FR1/FR2 | Note | Mandatory/Optional |
| x. Rel-16 NR Mobility Enhancement | X-0 | DAPS | 1. FFS Support of DAPS handover
 |  | Yes | N/A | The network cannot configure UE with DAPS HO  | FFSPer BC | Yes | Yes | N/A  | This is the general capability to cover default capabilities of DAPS HO, e.g. sync; dual UL, etc | Optional with capability signalling |
| x-1 | CHO | 1. Handling of CHO configuration, including execution condition and candidate cell configuration;
2. FFS Maximum candidate cells the UE can support; Default value FFS
3. CHO based failure handling;
4. FFS support of 2 trigger events for one execution condition
 |  | Yes | N/A | 1)The network cannot configure UE with CHO. 2) the network cannot configure candidate cells more than the max number the UE supported;3) the network cannot configure the UE to perform CHO based failure handling4) the network cannot configure 2 trigger events for one execution condition  | per UE | Yes | Yes | FFS |  | Optional with capability signalling (1 and, 3) |
| x-2 | T312 based PCell fast failure recovery | 1. T312 based PCell fast failure recovery
 |  | Yes | N/A | The network cannot configure UE with T312 based PCell fast failure recovery.  | per UE | Yes | Yes | support mixture of FDD/TDD and/or FR1/FR2  |  | Optional with capability signalling (1) |
| X-3 | T312 based PSCell fast failure recovery | 1. T312 based PSCell fast failure recovery
 |  | Yes | N/A | The network cannot configure UE with T312 based PSCell fast failure recovery | per UE | Yes | Yes | support mixture of FDD/TDD and/or FR1/FR2  |  | Optional with capability signalling (1) |

**Proposal 1 in [13]:** Agree the capabilities (x1-1, x1-3, x2, x3) including the revisions as indicated in the table for NR.

## RAN2 UE feature list on LTE mobility enhancement

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Need for the eNB to know if the feature is supported | **Consequence if the feature is not supported by the UE** | **Type****(the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)** | Need of FDD/TDD differentiation | Note | Mandatory/Optional |
| x. Rel-16 LTE Mobility Enhancement | X-0 | DAPS | 1. FFS Support of DAPS handover
 |  | Yes | The network cannot configure UE with DAPS HO | FFS Per BC | N/A | This is the general capability to cover default capabilities of DAPS HO, e.g. sync; dual UL, etc | Optional with capability signalling |
| x-1 | CHO | 1. Handling of CHO configuration, including execution condition and candidate cell configuration;
2. FFS Maximum candidate cells the UE can support; Default value FFS
3. CHO based failure handling;
4. FFS support of Multiple trigger events for one execution condition
 |  | Yes | 1)The network cannot configure UE with CHO. 2) the network cannot configure candidate cells more than the max number the UE supported;3) the network cannot configure the UE to perform CHO based failure handling4) the network cannot configure 2 trigger events for one execution condition | per UE | Yes |  | Optional with capability signalling (1 and 3) |

**Proposal 2 in [13]:** Agree the capabilities (x1-1, x1-3) including the revisions as indicated in the table for LTE.

|  |
| --- |
| [13] Based on companies’ inputs (12 companies):DAPS capability:  Per BC: No or comments 4 (Samsung, Nokia, ZTE, )Since this is related to DAPS capability discussion in next section. Rapporteur would like to leave it open. CHO:1) Handling of CHO configuration, including execution condition and candidate cell configuration;2) Maximum candidate cells the UE can support; Default value FFS- No: 4 (Huawei, HiSilicon, Ericsson, Vodafone)3) CHO based failure handling; 4) 2 trigger events for one execution condition- No: 4 (Samsung Ericsson, Vodafone, ZTE)T312:- TDD/FDD, FR1/FR2 diff: No 1 (Samsung)Rapporteur would suggest to leave the capability on CHO maximum candidate cell, CHO 2 trigger events and DAPS as FFS considering there are quite some companies have concern on maximum candidate cell, 2 trigger events and DAPS per BC. Agree the rest part of CHO and T312 as updated in the table  |

**Question 2-1: Do companies agree the proposal 1 and 2 in [13] listed as below? If no, pls indicate your reason.**

**Proposal 1 in [13]:** Agree the capabilities (x1-1, x1-3, x2, x3) including the revisions as indicated in the table for NR.

**Proposal 2 in [13]:** Agree the capabilities (x1-1, x1-3) including the revisions as indicated in the table for LTE.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Remark**  |
| Ericsson | Yes |  |
| QC | Yes except for X1-1 | We prefer X1-2: CHO max. number of cells and X1-4: 2 events for CHO execution as UE capabilities.we think X1-1 CHO capability can be implicit based on max. no of CHO cells (X1-2) supported by UE |
|  |  |  |
| IntelYesMediaTek | Yes |  |
| NEC | Yes |  |
| vivo | Yes |  |
| OPPO | Yes |  |
| Nokia | Yes | OK for DAPS. For CHO we still think number of cells capability should be defined as: ‘’support more than 1 candidate target cell with max equal to X’’ |
| Huawei, HiSilicon | Yes |  |

### 2.2 Open items proposed to be further discussed in this meeting (from all sub-topics)

**Issue 2-1 (same as email discussion): The DAPS capability for intra/inter freq was discussed in the email discussion 108#45 [13] as below:**

**Proposal 4 in [13]:** For intra freq DAPS, the capability intra-FreqDAPS is put under bandParameter, and for bandwidthClass B/C UE, the UE supports intraF DAPS with bandwidth class A for the band against source and target.

**Proposal 5 in [13]:** For inter freq DAPS, the capability inter-FreqDAPS is put under existing CA bandcombiantion, and same as CA, the CCs in the bandcombination with UL can all be source or target PCell.

**Proposal 1-1 in [16]: The issue on intra/inter freq DAP capability should be discussed based on email discussion 108#45;**

|  |
| --- |
| [13] Based on companies’ inputs (11 companies):**Ericsson’s approach:** if the UE indicates support of band X with bandwidth class C (meaning that it supports intra-band CA with 2 contiguous CCs) and indicates support of intra-freq DAPS in the band parameters, then the UE supports intra-frequency DAPS handover with band X and bandwidth class A against source and target. As clarified by Ericsson in the reflector, [Oscar] Yes, this is what we meant. In the example I gave I used bandwidth class C but it should also work for bandwidth class B.For instance:**BC: Band X, intra Freq DAPS (under bandParameter), bandwidthClass B/C;**Indicate intra-FreqDAPS under bandParameter, and for bandwidthClass B/C UE, the UE supports intraF DAPS with band X and bandwidth class A against source and target. **Ericsson approach: Yes 7 or 9**?(Ericsson, Qualcomm, Apple, Huawei, HiSilicon, ZTE, Intel, Nokia? Nokia Shanghai)**Proposal 4** For intra freq DAPS, the capability intra-FreqDAPS is put under bandParameter, and for bandwidthClass B/C UE, the UE supports intraF DAPS with bandwidth class A for the band against source and target.Note: we just need to add DAPS capability under existing CA bandcombination which the UE has supported; For instance the UE only supports BC1 as CA bandcombination, then just add DAPS under this BC1 if DAPS is supported for this BC1. **Question 3d: Do companies agree the way described above on how to support inter-freq/ inter band or intra+inter band DAPS?**Based on companies’ inputs (10 companies):**Inter freq/inter band or intra/inter band DAPS- put under existing CA bandcombiantion: 7 or 9? (Intel, Ericsson, Vodafone, Qualcomm, Apple, Huawei, HiSIlicon, Nokia?Nokia shanghai?)****Inter freq/intra band or intra/inter band DAPS - put under existing DC bandcombiantion: (ZTE)****Proposal 5** For inter freq DAPS, the capability inter-FreqDAPS is put under existing CA bandcombiantion, and same as CA, the CCs in the bandcombination with UL can all be source or target PCell.  |

**Based on the proposals in [13], the examples on support of inter/intra-freqDAPS are shown as below.**

**Band combination #1**

* Band1
	+ 1CC
* Band2
	+ 1CC
* inter-FreqDAPS
* Source PCell is 1 CC-Band1 and target PCell is 1CC -Band2
* Source PCell is 1 CC-band2 and target PCell is 1CC-band1

**Band combination #2**

* Band1
	+ 2CC
* Band2
	+ 1CC
* inter-FreqDAPS
* Source PCell is 1 CC-Band1 and target PCell is 1CC -Band2
* Source PCell is 1 CC-band2 and target PCell is 1CC-band1
* Source PCell is 1 CC-band1 and target PCell is 1CC-band1 but with  intra-band contiguous  inter-frequency

**Band combination #3**

* Band 1
	+ 1CC
* Band 1
	+ 1CC
* inter-FreqDAPS
* Source PCell is 1 CC-band1 and target PCell is 1CC-band1 but with intra-band non-contiguous  inter-frequency

**Band combination #4**

* Band 1
	+ 2CC
* inter-FreqDAPS
* Source cell is 1 CC-band1 and target cell is 1CC-band1 but with  intra-band contiguous  inter-frequency

**Band combination #5**

* Band1
	+ 2CC
	+ intra-FreqDAPS
* Band2
	+ 1CC
* Source PCell is 1 CC-band1 and target PCell is 1CC-band1 but with intra-frequency

**Band combination #6 (incorrect combination)**

* Band1
	+ 1CC
	+ intra-FreqDAPS
* Band2
	+ 1CC

**Question 2-2: Do companies agree the proposal 4 and 5 in [13] listed as below? If no, pls indicate your reason.**

**Proposal 4 in [13]:** For intra freq DAPS, the capability intra-FreqDAPS is put under bandParameter, and for bandwidthClass B/C UE, the UE supports intraF DAPS with bandwidth class A for the band against source and target.

**Proposal 5 in [13]:** For inter freq DAPS, the capability inter-FreqDAPS is put under existing CA bandcombiantion, and same as CA, the CCs in the bandcombination with UL can all be source or target PCell.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Remark**  |
| Ericsson | Yes | One clarification on example #2 above. We assume that if the UE reports:**Band combination #2*** Band1
	+ 2CC
* Band2
	+ 1CC
* inter-FreqDAPS

Then in addition to the options indicated in the example: * Source PCell is 1 CC-Band1 and target PCell is 1CC -Band2
* Source PCell is 1 CC-band2 and target PCell is 1CC-band1

The UE also supports the following option:* Source PCell is 1 CC-band1 and target PCell is 1CC-band1 where the two CCs are contiguous.

In other words the inter-FreqDAPS capability means that all types of inter-frequency handovers in the band combination are supportred, i.e.. inter-band inter-frequency handover and contiguous and non-contiguous intra-band inter-frequency handover.[Rap] Thanks, has added. |
| QC | Yes | It is possible to have example for **Band combination #2** as Ericsson expanded.But we think inter-FreqDAPS capability has to be provided per each BC (Intra Band inter freq, Inter Band inter freq cases to be indicated explicitly using inter-FreqDAPS capability indicator under given CA band combination). For example: If BC1, BC2, BC3 CA is supported. Intra Band-Inter Freq DAPS HO need to be indicated per each of BC1, BC2, BC3, which is same as example 3 and 4 mentioned above. Inter Band-Inter Freq DAPS HO need to be indicated per BC (Ex: source BC1+ Target BC2, source BC 2 + Target BC 3 etc), which is same as example 1 and 2 mentioned above.[Rap] Yes, same understanding.  |
| MediaTek | Yes |  |
| Intel | Yes |  |
| NEC | Yes |  |
| vivo | Yes |  |
| OPPO | Yes |  |
| Nokia | Partly yes | We don’t see a reason to say UE must always suppoort BW class C: Yes, this is the most likely case but we would like to allow UE to support DAPS also in other cases. |
| Huawei, HiSilicon | Yes |  |

**Issue 2-2 (same as email discussion): RAN1/4 capabilities were discussed in the email discussion 108#45 [13] as below:**

**RAN4 capabilities:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |  |
| --- | --- |
| Capability | Per UE, BC, FS, FSPC? |
| asyncDAPS | Per BC |
| supportedNumberTAG | Per BC |
| singleUL-Transmission | Per BC |
| intraBandDiffSCS [only for NR and only for intra-band] | Per BC or per Band and per band combination? |
| IntraBandIntraFreq-DAPS | Per BC or per Band and perBand combination? |

As discussed in [5], not all capabilities are needed since some of them have been covered by existing capabilities, e.g. multi TAG has been covered by CA capability; But do we consider the scenario that the UE cannot support CA, but only support DAPS, esp, intra freq case?**Question 3: Are any of above capabilities covered by existing capabilities? And whether these capabilities should be captured as per BC, per band per band combination capability?**Based on companies’ inputs (11 companies):Per BC: AsyncDAPS, supportedNumberTAG, singleUL-Transmission:8 (Huawei, HiSIlicon, Apple, Qualcomm, Ericsson, Vodafone, Samsung, Intel)Per Band per BC: intraBandDiffSCS, intraBandIntraFreq-DAPS: 8 (Huawei, HiSIlicon, Apple, Qualcomm, Ericsson, Vodafone, Samsung, Intel )AsyncDAPS per band: Nokia, Nokia ShanghaiAvoid repeating capability if already exists in CA or DC: Ericsson, ZTE, Samsung, Rapporteur would suggest to go for majority, i.e. Per BC: AsyncDAPS, supportedNumberTAG, singleUL-Transmission;Per Band per BC: intraBandDiffSCS, intraBandIntraFreq-DAPS;Rapporteur also agree that we do not need to introduce new capability if there are same one for existing CA or DC. **Proposal 8** RAN4 capabilities are introduced asPer BC: AsyncDAPS, supportedNumberTAG, singleUL-Transmission;Per Band per BC: intraBandDiffSCS, intraBandIntraFreq-DAPS;**Proposal 9** Double check whether any capabilities have been covered by existing capability in the bandcombination;**Question 4: for per band per band combination capability, any preference on where to put them for NR, in “BandParameters” as shown in section 6, i.e. same as LTE, or put under “FeatureSets”?**Based on companies’ inputs (9 companies):Per Band per BC in BandParameters:6 (Intel, Samsung, ZTE, Apple, Huawei, HiSilicon)Per Band per BC in FeatureSets:1 (Qualcomm)Only per Band, and in BandNR: 1 (Nokia)Rapporteur would suggest to go for majority, i.e. Per Band per BC is put in BandParameters. **Proposal 10**: Per Band per BC capability is put in BandParameters  |

**Question 2-3: Do companies agree the proposal 8 in [13] listed as below? If no, pls indicate your reason.**

**Proposal 8 in [13]:** RAN4 capabilities are introduced as

Per BC: AsyncDAPS, supportedNumberTAG, singleUL-Transmission;

Per Band per BC: intraBandDiffSCS, intraFreq-DAPS;

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Remark**  |
| Ericsson | Yes |  |
| QC | Yes |  |
| MediaTek | Yes | We agree to the categirization (per BC or per band). However, we have some concerns about intraBandDiffSCS:- According to RAN4 LS (R2-2000037)For NR only capabilities: • Support of different SCS in source and target cells in intra-band (separate signalling for intra-frequency and inter-frequency) HO- It seems that we have only one intraBandDiffSCS, instead of two.- For RRM measurements, intra-frequency means the same SSB location and the same SCS.- So we have two options: (1) Follow RAN4 LS, introduce *intraBandIntraFreqDiffSCS* and *intraBandInterFreqDiffSCS*; (2) introduce only one *intraBandDiffSCS* and it is for inter-frequency case.[Rap] Maybe we can address this issue in 2.8 diff for intra/inter freq, and 2.7 mandatory feature for DAPS UE. But default should be separate, sorry for my mistake. Has added in ASN.1 part as intraBandInterFreqDiffSCS-DAPS-r16 ENUMERATED {supported} OPTIONAL,intraBandIntraFreqDiffSCS-DAPS-r16 ENUMERATED {supported} OPTIONAL, |
| Intel  | Yes | intraBandDiffSCS can be discussed under 2.8. But default should be separate, sorry for my mistake. |
| NEC | Yes |  |
| vivo | Yes |  |
| OPPO | Yes |  |
| Nokia | Yes (with comments) | We can accept this for the sake of progress but would like to recheck the overall capability size in the next meeting to see if optimizations to reduce overhead are needed. RAN2 is already attempting to send an LS to RAN1 where we request RAN1 to avoid Per-band, per BC parameters, so RAN2 should also strive to do the same itself. |
| Huawei, HiSilicon | Yes |  |

Regarding **Proposal 9** in [13] Double check whether any capabilities have been covered by existing capability in the bandcombination; If proposal 4 in [13] is agreed, i.e. reuse CA bandcombination, then supportedNumberTAG for CA can be reused for DAPS, i.e. we do not need to introduce a new DAPS capability supportedNumberTAG.

**Question 2-4: are any DAPS capabilities covered by existing capabilities, e.g. e.g. existing** supportedNumberTAG. **can be reused for DAPS,**

|  |  |  |
| --- | --- | --- |
| **Company** | **Reused existing capability**AsyncDAPS? supportedNumberTAG? singleUL-Transmission?intraBandDiffSCS?  | **Remark**  |
| Ericsson | The supportedNumberTAG can be re-used. |  |
| QC | For CA, multiTAG concept is optional feature and is mandatory for DC.For DAPS, we think multi TAG is essential for a given BC between source and target cell. If DAPS is supported for given CA band combination, we need to mandate UE to indicate multiTAG (not as optional like in CA case). |  |
| MediaTek | supportedNumberTAG | (see above comments about intraBandDiffSCS) |
| Intel | supportedNumberTAG |  |
| NEC | supportedNumberTAG can be reused |  |
| vivo | supportedNumberTAG |  |
| OPPO | supportedNumberTAG |  |
| Nokia | Agree to reuse |  |
| Huawei, HiSilicon | supportedNumberTAG |  |

**Question 2-5: Is proposal 10 in [13] indicated below agreeable? ? If no, pls indicate your reason.**

**Proposal 10 in [13]**: Per Band per BC capability (intraBandDiffSCS, intraFreq-DAPS) is put in BandParameters**,** .

|  |  |  |
| --- | --- | --- |
| **Company** | Yes/No? | **Remark**  |
| Ericsson | Yes |  |
| QC | Yes |  |
| MediaTek | Yes |  |
| Intel | Yes | But intraFreqIntraBandDiffSCS shall be per BC.  |
| NEC | Yes |  |
| vivo | Yes |  |
| OPPO | Yes |  |
| Nokia | yes | We can accept this for the sake of progress but would like to recheck the overall capability size in the next meeting to see if optimizations to reduce overhead are needed. RAN2 is already attempting to send an LS to RAN1 where we request RAN1 to avoid Per-band, per BC parameters, so RAN2 should also strive to do the same itself. |
| Huawei, HiSilicon | Yes |  |

**RAN1 capabilities:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RAN1 identified capabilities are summarized as below:;

|  |  |
| --- | --- |
| Capability | Per UE, BC, FS, FSPC? |
| uplinkPowerSharingDAPS (semi-static mode 1, semi-static mode 2, dynamic) | Per BC |
| pdcch-BlindDetectionSource | Per BC |
| pdcch-BlindDetectionTarget | Per BC |

Note: IntraBandIntraFreq-DAPS is same as RAN4;**Question 5: Do companies agree the above RAN1 identified capabilities are per BC?**Based on companies’ inputs (7 companies):• UplinkPowerSharingDAPS-HO• pdcch-BlindDetectionMCG1-UE: • pdcch-BlindDetectionMCG2-UE:Per BC: 5 (Intel, Qualcomm, Apple, Huawei, HiSIlicon)Rapporteur would suggest to go for majority, i.e. UplinkPowerSharingDAPS-HO, pdcch-BlindDetectionMCG1-UE and pdcch-BlindDetectionMCG2-UE are introduced as per BC capabilities. **Proposal 11** UplinkPowerSharingDAPS-HO, pdcch-BlindDetectionMCG1-UE and pdcch-BlindDetectionMCG2-UE are introduced as per BC capabilities. |

**Question 2-6: Is proposal 11 in [13] indicated below agreeable? ? If no, pls indicate your reason.**

**Proposal 11 in [13]** UplinkPowerSharingDAPS-HO, pdcch-BlindDetectionMCG1-UE and pdcch-BlindDetectionMCG2-UE are introduced as per BC capabilities.

|  |  |  |
| --- | --- | --- |
| **Company** | Yes/No? | **Remark**  |
| Ericsson | Yes(but see question) | The NR-DC capabilities pdcch-BlindDetectionMCG-UE and pdcch-BlindDetectionMCG-UE are per UE capabilities. What is the reason for having them per BC in DAPS?**[Rap]So far, It is indicated as per [BC] in RAN1 capability discussion. I agree for MR-DC, it is per UE capability.**  |
| QC | Yes |  |
| MediaTek | Yes |  |
| Intel | Yes |  |
| NEC | Yes |  |
| vivo | Yes |  |
| OPPO | Yes |  |
| Nokia | Yes, but | Not sure why these must be per BC? And not per UE (as argued by Ericsson)? Whenever UE supports DAPS, these should be mandatory. So whenever UE indicates it supports DAPS, it must indicate these parameters at least. They are conditional mandatory for UE supporting DAPS (i.e. the fields are mandatory if UE indicates DAPS support) |
| Huawei, HiSilicon | Yes |  |

**Issue 2-3: mandatory/optional of features:**

As indicated in [16],

**DISC S1\_1:** Discuss in a new email discussion on the issue Mandatory/optional of DAPS capabilities;

On top of email discussion, seems [9] also discussed mandatory/optional issues:

* Mandatory for DAPS UE: intra-frequency, synchronous DAPS (for some source/target band combination for at least one supported band combination) with the same SCS in both source and target cells with the same TA for both source and target and single UL.[9];

Nokia

Based on above discussion, RAN1/4 DAPS capabilities are:

|  |  |  |  |
| --- | --- | --- | --- |
| Capability | Per UE, BC, FS, FSPC? | Mantory for DAPS UE? | Different for intra/inter DAPS? |
| asyncDAPS | Per BC |  |  |
| supportedNumberTAG | Per BC |  |  |
| singleUL-Transmission | Per BC |  |  |
| intraBandDiffSCS [only for NR and only for intra-band] | Per BC or per Band and per band combination? |  | Yes (as indicated in RAN4 LS) |
| IntraBandIntraFreq-DAPS | Per BC or per Band and perBand combination? |  |  |
| uplinkPowerSharingDAPS (semi-static mode 1, semi-static mode 2, dynamic) | Per BC |  |  |
| pdcch-BlindDetectionSource | Per BC | Yes |  |
| pdcch-BlindDetectionTarget | Per BC | Yes |  |

Besides the question o nmandatory for DAPS UE, it would be good also discuss whether the capabilities are common for intra/inter DAPS or not.

**Question 2-7: Regarding the capabilities indicated in above table, is any capability mandatory for DAPS UE? E.g. pdcch-BlindDetectionSource and pdcch-BlindDetectionTarget should be mandatory for DAPS UE.**

|  |  |  |
| --- | --- | --- |
| **Company** | Which capability is mandatory for DAPS UE? | **Remark**  |
| Ericsson | ? | Needs to study this further. Some comments:- It seems that in order to support DAPS the UE must at least support supportedNumberTAG >= 2 since we have two MAC entities.- For the optionality/mandatoriness of pdcch-BlindDetectionSource and pdcch-BlindDetectionTarget we think we can follow the same behaviour as for pdcch-BlindDetectionMCG and pdcch-BlindDetectionSourceSCG used in NR-DC.  |
| QC |  | Mandatory with capability: Intra Band intra freq DAPS, pdcch-BlindDetectionSource and pdcch-BlindDetectionTarget, uplinkPowerSharing, multiTAGsupport.Optional capability: Async DAPS, single UL Tx, intraBandDiffSCS, Inter Freq intra band/inter band DAPS capability. |
| MediaTek |  | Agree with QC |
| Intel |  | Mandatory with capability: pdcch-BlindDetectionSource and pdcch-BlindDetectionTarget, uplinkPowerSharing, multiTAGsupport. |
| vivo |  | Agree with QC |
| OPPO |  | Mandatory with capability: pdcch-BlindDetectionSource and pdcch-BlindDetectionTarget |
| Nokia |  | We think the blind decoding capabilities are conditionally mandatory for DAPS: If UE supports DAPS, it will always indicate at least these parameters (i.e. the fields would be mandatory inside the DAPS capability IE). |
| Huawei, HiSilicon |  | Basically agree with QC. And for Mandaroty with capability, UE should also support synchronous DAPS. |

**Question 2-8: Regarding the capabilities indicated in above table, is any capability different for intraFreq DAPS and interFreq DAPS?**

|  |  |  |
| --- | --- | --- |
| **Company** | Which capability is different for intraFreqDAPS and interFreqDAPS? | **Remark**  |
| Ericsson | ? | We assume that if the UE indicates asyncDaps under BC and intraFreq-DAPS under BP, then the UE supports asynchronous intra-frequency DAPS handover.  |
| QC |  | Except Intra Freq and Inter Freq DAPS capabilities, all other capabilities are equally applicable for both intra and inter freq DAPS scenarios. |
| MediaTek |  | Except for IntraBandIntraFreq-DAPS capability, all other capabilities are equally applicable for both intra and inter freq DAPS scenarios. But please also see our concerns about intraBandDiffSCS in Q2-3. |
| Intel |  | Exept for intra/inter freq DAPS, as indicated in RAN4 LS, intraBandDiffSCS should be different for intraband-intra freq and intraBand-InterFreq |
| NEC |  | Agree with MTK and Intel |
| vivo |  | Agree with QC. |
| OPPO |  | We don’t see any other different capabilities. |
| Nokia |  | Agree with QC. |
| Huawei, HiSilicon |  | Agree with MTK and Intel |

The ASN.1 parts for LTE and NR are provided in section 7. Companies are invited to provide your comments if any.

**Question 2-9: Can the ASN.1 parts in section 7 to be used as baseline? And any comments?**

|  |  |  |
| --- | --- | --- |
| **Company** | Yes/No? | **Remark**  |
| Ericsson | Yes |  |
| QC | Yes |  |
| MediaTek | Yes |  |
| Intel | Yes |  |
| NEC | Yes |  |
| vivo | Yes |  |
| OPPO | Yes |  |
| Nokia  | Yes |  |
| Huawei, HiSilicon | Yes |  |

# Network coordination

### Agreements proposed to be agreed in this meeting (from all sub-topics)

As proposed in [16], below proposal is considered as easy agreement.

**Proposal S2\_1:** Same as legacy HO, Source decides source configuration to be used during DAPS handover and the restriction in target; target determines the target configuration based on received source configuration to be used during DAPS HO and UE capabilities, and generates the DAPS handover command and the target node sends the DAPS handover command to the source node in the X2/Xn HANDOVER REQUEST ACKNOWLEDGE which transparently forwards it to the UE.

**Proposal S2\_2:** Same as legacy reconfiguration procedure, modification of target configuration can be sent in the same message for source release;

**Question 3-1: Do companies agree the proposal S2\_1, S2-2 listed above? If no, pls indicate your reason.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Remark**  |
| Ericsson | Yes | For proposal S2\_1 we would like to clarify that the source configuration issent in the *sourceConfig* field in *HandoverPreparationInfo* in the same way as in legacy handover (see below). If the source connection was downgraded before the DAPS handover we don’t include the non-downgraded source configuration in the *HandoverPreparationInfo* like some companies proposed.HandoverPreparationInformation-IEs ::= SEQUENCE {ue-CapabilityRAT-List UE-CapabilityRAT-ContainerList,sourceConfig AS-Config OPTIONAL, -- Cond HOrrm-Config RRM-Config OPTIONAL,as-Context AS-Context OPTIONAL,nonCriticalExtension SEQUENCE {} OPTIONAL}AS-Config ::= SEQUENCE {rrcReconfiguration OCTET STRING (CONTAINING RRCReconfiguration), sourceRB-SN-Config OCTET STRING (CONTAINING RadioBearerConfig) OPTIONA sourceSCG-NR-Config OCTET STRING (CONTAINING RRCReconfiguration) OPTIONA sourceSCG-EUTRA-Config OCTET STRING OPTION ] sourceSCG-Configured ENUMERATED {true} OPTION ]]} |
| QC | Yes | We think source can provide both original and downgraded source configuration to target cell. If a target cell does not want to accept DAPS HO and prefers to perform legacy HO only, in that case providing original source configuration to target cell is needed , which is same as legacy HO behaviour. In our view, source performing source downgrade before DAPS HO mainly for DAPS purpose in not a good NW implementation because it adds HO delay and extra siganling overhead as well. If any NW does sourowngraderde implementation before DAPS HO preparation by using RRC Reconfig procedure, since source is already downgraded and source can just provide downgraded source configuration only to target cell in inter node RRC message.But spec perspective, we need to allow flexibility for source to provide original and downgraded source configuration to target cell. |
| MediaTek | Yes |  |
| Intel | Yes | Same view as Ericsson.  |
| NEC | No | We think it is more reasonable for the target node to decide on the capability coordination result, as the the transmission toward target should be prioritized. The source should sends current configuration to the target, the target decides target configuration to be used during DAPS handover and restriction in the source; source update the source configuration and sends the updated configuration and handover command in separate RRC messages. |
| vivo | Yes | Agee with QC that the target should be able to apply the legacy handover. |
| OPPO | Yes | We think source just needs to provide the downgraded source configuration, if decided to be downgraded, to target cell since it is anyway the source’s decision to perform DAPS HO. DAPS HO can only be done if target provides the configuration not exceeding UE’s capabilities.. |
| Nokia | Yes | We agree with Ericsson. Source indicates what it is using and target adapts to that. What’s important is that source doesn’t need to “downgrade” always. |
| Huawei, HiSilicon | Yes |  |

### 3.2 Issues to be covered by other email discusions and should be treated based on email discussion report (Placeholder)

In [16], **The mechanisms on capability coordination, LTE DC based or MR DC based should be discussed based on email discussion 108#66;** However in [14], it proposed to have further discussion on it.

|  |
| --- |
| ***[14] Phase 1:***Option 2 LTE DC: 7 Option 3 MR DC:5Option 4 LTE DC for LTE, MR DC for NR: 3Looks like the difference between option 2 and option 3 is, option 2 is LTE DC based solution, and option 3 is EN-DC based solution. ***FQ 11 DAPS capability coordination*** *was discussed in phase 1 discussion. But there is no consensus. It would be good to understand the options first.* ***Option 2****: Based on source link configuration to be used during DAPS HO, UE capabilities, maxSCH-TB-BitsDL, maxSCH-TB-BitsUL, powerCoordinationInfo within HandoverPreparationInformation message; [17]***Based on the inputs from companies:****Option 2 for LTE: 6 companies****Option 2 for NR: 6 companies**The majority is to use option 2 for both LTE and NR, Rapporteur would suggest to go for majority. But what additional parameters are needed for NR need further discussion. .**Proposal 46** For LTE, the DAPS network coordination is based on source link configuration to be used during DAPS HO, UE capabilities, maxSCH-TB-BitsDL, maxSCH-TB-BitsUL, powerCoordinationInfo within HandoverPreparationInformation message; **Proposal 47** For NR, the DAPS network coordination is based on source link configuration to be used during DAPS HO, UE capabilities, maxSCH-TB-BitsDL (to be redefined for NR), maxSCH-TB-BitsUL (to be redefined for NR), powerCoordinationInfo within HandoverPreparationInformation message; FFS on additional parameters  |

**Question 3-2: Are proposal 46/47 in [13] indicated below agreeable? ? If no, pls indicate your reason.**

**Proposal 46 in [14]** For LTE, the DAPS network coordination is based on source link configuration to be used during DAPS HO, UE capabilities, maxSCH-TB-BitsDL, maxSCH-TB-BitsUL, powerCoordinationInfo within HandoverPreparationInformation message;

**Proposal 47** in [14]:For NR, the DAPS network coordination is based on source link configuration to be used during DAPS HO, UE capabilities, maxSCH-TB-BitsDL (to be redefined for NR), maxSCH-TB-BitsUL (to be redefined for NR), powerCoordinationInfo within HandoverPreparationInformation message; FFS on additional parameters

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No?** | **Remark**  |
| Ericsson | Yes |  |
| QC | Yes |  |
| MediaTek | Yes |  |
| Intel  | Yes |  |
| NEC | No | As we describe in Q 3-1, it is the target decide on the capability split ratio, the message should be HO command message. For MR-DC, maxSCH-TB-Bits are not coordinated between MN and SN, why needed for NR DAPS?  |
| vivo | Yes |  |
| OPPO | Yes |  |
| Nokia | No | Agree fully with NEC, source and target can push max bit rate as PCell allows during the DAPS window. If we only use PCells, there is absolutely no need for maxBitrate. |
| Huawei, HiSilicon | Yes |  |

**Proposal 2-2: The issue how to handle the case if source+target configuration exceeds the UE capability should be discussed based on email discussion 108#66;**

**Proposal 3-1: The issue on the handling of source configuration change should be discussed based on email discussion 108#66;**

There are clear majority in [14] for above issues. Rapporteur assume these issues can be solved based on email discussion.

**Question 3-3: Has been agreed as**

Proposal 32. Following legacy handling on network configuration error if network (source+target) configuration exceeds the UE capability, no specification change is needed.

 **The question has been removed since RAN2 has agreed this.**

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

### Open items proposed to be further discussed in this meeting (from all sub-topics)

As indicated in [16]: **DISC S2\_1:**Discuss in a new email discussion on the issue for LTE and/or NR whether/how the UE needs to report the PH value of SpCell of one MAC entity to the other MAC entity during DAPS HO;

|  |
| --- |
| **Option 1: During DAPS operation, similar as DC operation, each MAC entity (i.e. MAC entity for source cell group and MAC entity for target cell group) will include the PH value of the serving cells for both source cell group and target cell group in the corresponding PHR report MAC CE.****Option 2: During DAPS operation, each MAC entity will only include the PH value of the serving cells within its own cell group in the corresponding PHR report MAC CE. The UE will determine the PHR format used in target side based on the same rules as Rel-15 (i.e. no further optimization will be considered for PHR reporting in DAPS HO).** * ZTE

**As commented in the reflector “*For LTE, reporting the PH of another MAC entity would require “Dual Connectivity Power Headroom Report MAC Control Element” which is currently only applicable for DC. For NR, the “Multiple Entry PHR MAC CE” is used for MR-DC or UL CA according to 38.331. Then if the target/source configuration includes the UL CA, then the “Multiple Entry PHR MAC CE” will be used to report the PH of the other MAC entity without any specification change.”,***it would good to handle this for LTE and NR separately, and discuss this in a new email discussion instead of online discussion.  |

To our understanding, RAN1 already agreed to support dynamic power sharing. Dynamic power sharing cannot work if the UE cannot report the PH value of Pcell of one MAC entity to the another MAC entity during DAPS HO.



Figure 6.1.3.9-1: Multiple Entry PHR MAC CE with the highest *ServCellIndex* of Serving Cell with configured uplink is less than 8



Figure 6.1.3.6b-1: Dual Connectivity PHR MAC Control Element

So far, if we do not consider SCells, i.e. only source Pcell and target Pcell, existing LTE and NR PHR MAC CE can be reused. But we need additional changes to clarifify which one is source Pcell, which one is target Pcell;

If we want to consider Scells, then we have to support the Scell index coordination between source and target, same as DC.

**Question 3-4: Should the UE report the PH value of Pcell of one MAC entity to the another MAC entity during DAPS HO?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No?** | **Remark**  |
| Ericsson | ? | Would like to have some more time to analyse this issue. |
| QC | Yes |  |
| MediaTek | Yes |  |
| Intel | Yes | Otherwise dynamic power sharing cannot be supported.  |
| NEC | Yes |  |
| vivo |  | Depends on the change on the MAC specification. We should avoid introducing new PHR format |
| OPPO |  | Not sure about this. What if UE only supports single UL? |
| Nokia | Not sure | We are not sure this is needed in most cases. UE anyway has to handle the maximum power limits, and it’s unlikely PHR would be sent during DAPS HO |

**Question 3-5: If answer is yes, what additional changes should be? ,e.g. to clarify which one is source and which one is target? Cell index coordination between source and target if SCells are supported?**

|  |  |
| --- | --- |
| **Company** | **Any additional changes?** |
| QC | We need sometime to look at changes needed. |
| Intel | If we do not support Scells, only changes are to clarify which one is source and which is target in MAC spec for existing PHR MAC CE.  |
| Vivo | It seems that the PHR format does not have to be changed. We probably only need to add some clarification text in the MAC specification. |

# Scell handling

**Issue 4-1: as discussed in [13], whether Scells not released (regardless of activated/deactivated) during DAPS HO are counted against the total number of CCs the UE can support.**

|  |
| --- |
| Based on companies’ inputs (11 companies):**The configured Cells (Scells may be activated or deactivated) in source and target cannot exceed the total number of CCs in one bandcombination:****Yes (active/inactive): 5 (Intel, Samsung, ZTE, Qualcomm, Apple)****Yes (only active): 2 (Ericsson, Vodafone, )****Only source Pcell and target Pcell: 4 (Nokia, Nokia Shanghai, Huawei, HiSilicon)**To support DAPS, Rapporteur does not see the reason to deviate from current CA/DC principle, i.e. Scells not released during DAPS HO (If Scell is supported during DAPS HO) should be counted against the total number of CCs the UE can support.1. Scells not released during DAPS HO (If Scell is supported during DAPS HO) should be counted against the total number of CCs the UE can support.
 |

**Question 4-1: Should Scells not released (regardless of activated/deactivated) during DAPS HO be counted against the total number of CCs the UE can support?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No?** | **Remark**  |
| Ericsson | It is preferred if the deactived Scells are not counted. | If deactivated Scells are counted and the UE reports DAPS support in a BC with only 2 CCs, the target node has to release all Scells in the handover command and then add them again (using full configuration) when the source cell has been released. If the deactivated Scells are not counted, however, the target node could maintain the existing Scells when it sends the handover command and then activate them using a MAC CE after it has released the source cell. The latter approach is more efficient since the Scells can be configured using delta config. |
| QC | Yes (deactivated Scells shall be considered towards total CC count) | As we discussed in previous email discussions, any deactivated Scells also will consume UE’s baseband and RF resources and this is basic UE principle to be followed. Target cell can add additional Scells at the time of source cell releases in same RRC message.Alternatively, release all Scells during DAPS HO and this is inline with what RAN4 LS reply indicated. |
| MediaTek | Yes | Deactived Scells should be counted. This may introduce some “release and add again” procedure, but it avoids potential UE implementation confusions. |
| Intel | Yes |  |
| NEC | Yes  | We should follow the existing principle to count the deactivated Scells as the total CC number. |
| Vivo | Ye |  |
| OPPO | Yes |  |
| Nokia | Yes | Agree with NEC and MTK, with the addition that SCells are only counted “once” since in practice they would never be used for source (see later). |
| Huawei, HiSilicon | Yes | It should be counted as deactivated SCells also consume RF resources. |

**\**

The handling on SCells was discussed in the email discussion 108#45 [13] as below:

|  |
| --- |
| Based on above descriptions, we could see to support more than 2CCs scenarios (i.e. source PCell, target Pcell, and Scells), more clarifications are needed on UE capability. Which options are allowed during R16 DAPS HO A) source Pcell + target Pcell only (i.e. only 2 Cells for DAPS, the UE cannot indicate the support of DAPS in more than 2CCs’s combination)B) source PCell + target PCell + Scells (in both source, target) (i.e. more than 2 Cells for DAPS, SCell is considered during DAPS HO)**Note: RAN4 only considered DAPS with PCell in souce and PCell in target in Rel-16.** **Question 3f: Can DAPS capability be indicated in more than 2CCs BC, i.e. A or B?**Based on companies’ inputs (10 companies):DAPS HO without SCells: 7 (Huawei, HiSilicon, Nokia, Nokia Shanghai, Qualcomm, Apple, Intel )DAPS HO with SCells: 3 (Ericsson, Vodafone, ZTE)Rapporteur would suggest to go for majority, i.e. in Rel-16 DAPS HO only supports source PCell and target PCell, that means during the DAPS HO, all SCells (if configured in source) shall be released.**Proposal 6** In Rel-16, DAPS HO only supports source PCell and target PCell.If answer is B, i.e. allow SCells, we also need to consider what is SCell state on both Source and Target cells during R16 DAPS HO execution period.If answer is A, i.e. not allow SCells, we also need to consider how to release SCells during DAPS HO?**Question 3g: how to handle SCells during R16 DAPS HO execution period?**Based on companies’ inputs (11 companies):Explicitly release: 9 (Huawei, HiSilicon, Apple, Qualcomm, ZTE, Nokia, Nokia shanghai, Samsung, Intel)Implicitly release: 1 (Qualcomm)Rapporteur would suggest to go for majority, i.e. in Rel-16 DAPS HO, SCells (if configured in source) shall be released based on existing way, i.e. explicitly release from network using DAPS HO command. **Proposal 7** During DAPS HO, SCells (if configured in source) shall be released based on existing way, i.e. explicitly release from network using DAPS HO command. |

**Option 1:SCells are released in HO command, and not configured in HO command [5] [11]**

* Huawei, HiSilicon , ZTE
* **Rap: it can be supported without specification change; (maybe only a restriction as a Note or in field description)**

**Option 2: Same as legacy HO, source SCells becomes target SCells if not released by target, and default state is inactive unless the UE supports direct SCell activation (no source SCells in DAPS HO); [1]**

* Ericsson
* **Rap: it can be supported without specification change; Not supported in RAN4.**

**Option 3: source/target SCells are deactivated upon receiving HO command; After DAPS HO, Source SCells are released by network, target SCells are activated based on MAC CE; UE is not required to do RRM/CQI measurement on SCells until source cell is released[9] [11]**

* Nokia, ZTE
* **Rap: We have to discuss how to handle the release of Scells in HO command, and how to handle the delta signalling, how to handle RRM/CQI, etc.) Not supported in RAN4.**

**Question 4-2: How to handle SCells during DAPS HO?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option 1/2/3/ others?** | **Remark**  |
| Ericsson | Option 2 | Whether the target node keeps the SCells or releases them in the HO command depends on the UE capabilities that the UE reports. For example if the UE reports a DAPS BC with 3 CCs (as in BC examples #2 and #5 above) then the target could keep 1 SCell during the DAPS handover, but if the UE reports a DAPS BC with only 2CCs (as in BC examples #1, #3, and #4) then all SCells would need to be released in order to not exceed the UE capabilities\*. Forcing the target node to always release the SCells as suggested in option 1 seems unnecessary and would make it more difficult to support SCells in the future.How to handle the SCells in case of fallback can be further discussed. We think releasing the SCells at fallback is the simplest option and it would also be similar to how SCells are handled during RRC re-establishment.\* We assume here that the also the deactivated SCells are counted towards the total number of SCells that the UE can support. If the deactivated SCells are not counted then the target could keep all SCells even if the DAPS BC only contains 2CCs (see our answer to Q4-1).  |
| QC | Option 1  | For Option 1, Source Scells can be released either explicitly or implicitly.Alternatively, releases all source Scells explicitly and any target Scells added during DAPS HO shall remain in deactivated state until Source cell is released. |
| MediaTek | Option 1 |  |
| Intel | Option 1 | It could make the specification simplier, and avoid the the coordination between nodes caused by PHR for the support of dynamic power sharing.  |
| NEC | Option 1 but | Should ‘released’ in Q1 be changed to “deactivated”? As Q 4-1 asks for Scells not released, while Option 1 implies that all Scells are released…We think that the Scells of the source should be explicitly released or deactivated, and the Scells of the target should be explicitly deactivated. |
| vivo | Option 1/2 | We should avoid too much specification change for the SCell handling, as the DAPS handover should mainly focus on the PCell. |
| OPPO | Option 1 | Option 1 is simple by NW implementation, and we prefer explicit release – supported by existing signaling. |
| Nokia | Option 3 | We think that only PCells are used during DAPS. For source SCells, they are not used and once the source leg is released, they are gone. And such limitation should not be an issue in Rel-16. |
| Huawei, HiSilicon | Option 1 | We also need to clarify that if SCG exists it should also be released in HO command or before HO command. |

# Conclusion

The followings are proposed:

# References

[1] R2-2000123 Capability coordination for DAPS handover Ericsson

[2] R2-2000537 UE capability co-ordination signalling aspects for DAPS HO Qualcomm Inc, Google Inc, Apple Inc, MediaTek Inc, Charter Communications

[3] R2-2000654 Discussion on UE capabilities for DAPS HO OPPO

[4] R2-2000655 Further considerations on capability coordination OPPO

[5] R2-2000734 Discussion on SCell handling during DAPS HO Huawei, HiSilicon

[6] R2-2000735 Discussion on UE capability coordination for DAPS HO Huawei, HiSilicon

[7] R2-2000759 Remaining issues on capability coordination for DAPS NEC

[8] R2-2000897 Further Discussion on Capability Coordination for DAPS CATT

[9] R2-2001153 UE capability handling for DAPS Nokia Italy

[10] R2-2001164 Capability coordination for DAPS Samsung Telecommunications- Late

[11]R2-2001261 Remaining issues on UE capability coordination for DAPS HO ZTE Corporation, Sanechips

[12] R2-2001539 Handling Excess of UE Capability in DAPS HO LG Electronics Inc.

[13] R2-2000459 UE feature list for LTE and NR mobility Intel Corporation

[14] R2-2000461 Report of [108#66][LTE NR Mob] Open issues for LTE and NR mobility Intel Corporation

[15] R2-2001149 Source connection handling during DAPS HO Qualcomm Incorporated

[16] R2-2002101 Summary of DAPS UE capabilities for DAPS HO in AI 7.3.2.2.2 Intel Corporation

# ASN.1 proposal

## LTE RRC, capability structure, refer to TS36.331

#### – *UE-EUTRA-Capability*

The IE *UE-EUTRA-Capability* is used to convey the E-UTRA UE Radio Access Capability Parameters, see TS 36.306 [5], and the Feature Group Indicators for mandatory features (defined in Annexes B.1 and C.1) to the network. The IE *UE-EUTRA-Capability* is transferred in E-UTRA or in another RAT.

NOTE 0: For (UE capability specific) guidelines on the use of keyword OPTIONAL, see Annex A.3.5.

*UE-EUTRA-Capability* information element

-- ASN1START

UE-EUTRA-Capability ::= SEQUENCE {

 accessStratumRelease AccessStratumRelease,

 ue-Category INTEGER (1..5),

 pdcp-Parameters PDCP-Parameters,

 phyLayerParameters PhyLayerParameters,

 rf-Parameters RF-Parameters,

 measParameters MeasParameters,

 featureGroupIndicators BIT STRING (SIZE (32)) OPTIONAL,

 interRAT-Parameters SEQUENCE {

 utraFDD IRAT-ParametersUTRA-FDD OPTIONAL,

 utraTDD128 IRAT-ParametersUTRA-TDD128 OPTIONAL,

 utraTDD384 IRAT-ParametersUTRA-TDD384 OPTIONAL,

 utraTDD768 IRAT-ParametersUTRA-TDD768 OPTIONAL,

 geran IRAT-ParametersGERAN OPTIONAL,

 cdma2000-HRPD IRAT-ParametersCDMA2000-HRPD OPTIONAL,

 cdma2000-1xRTT IRAT-ParametersCDMA2000-1XRTT OPTIONAL

 },

 nonCriticalExtension UE-EUTRA-Capability-v920-IEs OPTIONAL

}

-- Late non critical extensions

UE-EUTRA-Capability-v9a0-IEs ::= SEQUENCE {

 featureGroupIndRel9Add-r9 BIT STRING (SIZE (32)) OPTIONAL,

 fdd-Add-UE-EUTRA-Capabilities-r9 UE-EUTRA-CapabilityAddXDD-Mode-r9 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-r9 UE-EUTRA-CapabilityAddXDD-Mode-r9 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v9c0-IEs OPTIONAL

}

UE-EUTRA-Capability-v9c0-IEs ::= SEQUENCE {

 interRAT-ParametersUTRA-v9c0 IRAT-ParametersUTRA-v9c0 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v9d0-IEs OPTIONAL

}

UE-EUTRA-Capability-v9d0-IEs ::= SEQUENCE {

 phyLayerParameters-v9d0 PhyLayerParameters-v9d0 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v9e0-IEs OPTIONAL

}

UE-EUTRA-Capability-v9e0-IEs ::= SEQUENCE {

 rf-Parameters-v9e0 RF-Parameters-v9e0 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v9h0-IEs OPTIONAL

}

UE-EUTRA-Capability-v9h0-IEs ::= SEQUENCE {

 interRAT-ParametersUTRA-v9h0 IRAT-ParametersUTRA-v9h0 OPTIONAL,

 -- Following field is only to be used for late REL-9 extensions

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v10c0-IEs OPTIONAL

}

UE-EUTRA-Capability-v10c0-IEs ::= SEQUENCE {

 otdoa-PositioningCapabilities-r10 OTDOA-PositioningCapabilities-r10 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v10f0-IEs OPTIONAL

}

UE-EUTRA-Capability-v10f0-IEs ::= SEQUENCE {

 rf-Parameters-v10f0 RF-Parameters-v10f0 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v10i0-IEs OPTIONAL

}

UE-EUTRA-Capability-v10i0-IEs ::= SEQUENCE {

 rf-Parameters-v10i0 RF-Parameters-v10i0 OPTIONAL,

 -- Following field is only to be used for late REL-10 extensions

 lateNonCriticalExtension OCTET STRING (CONTAINING UE-EUTRA-Capability-v10j0-IEs) OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v11d0-IEs OPTIONAL

}

UE-EUTRA-Capability-v10j0-IEs ::= SEQUENCE {

 rf-Parameters-v10j0 RF-Parameters-v10j0 OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

UE-EUTRA-Capability-v11d0-IEs ::= SEQUENCE {

 rf-Parameters-v11d0 RF-Parameters-v11d0 OPTIONAL,

 otherParameters-v11d0 Other-Parameters-v11d0 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v11x0-IEs OPTIONAL

}

UE-EUTRA-Capability-v11x0-IEs ::= SEQUENCE {

 -- Following field is only to be used for late REL-11 extensions

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v12b0-IEs OPTIONAL

}

UE-EUTRA-Capability-v12b0-IEs ::= SEQUENCE {

 rf-Parameters-v12b0 RF-Parameters-v12b0 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v12x0-IEs OPTIONAL

}

UE-EUTRA-Capability-v12x0-IEs ::= SEQUENCE {

 -- Following field is only to be used for late REL-12 extensions

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1370-IEs OPTIONAL

}

UE-EUTRA-Capability-v1370-IEs ::= SEQUENCE {

 ce-Parameters-v1370 CE-Parameters-v1370 OPTIONAL,

 fdd-Add-UE-EUTRA-Capabilities-v1370 UE-EUTRA-CapabilityAddXDD-Mode-v1370 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v1370 UE-EUTRA-CapabilityAddXDD-Mode-v1370 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1380-IEs OPTIONAL

}

UE-EUTRA-Capability-v1380-IEs ::= SEQUENCE {

 rf-Parameters-v1380 RF-Parameters-v1380 OPTIONAL,

 ce-Parameters-v1380 CE-Parameters-v1380,

 fdd-Add-UE-EUTRA-Capabilities-v1380 UE-EUTRA-CapabilityAddXDD-Mode-v1380,

 tdd-Add-UE-EUTRA-Capabilities-v1380 UE-EUTRA-CapabilityAddXDD-Mode-v1380,

 nonCriticalExtension UE-EUTRA-Capability-v1390-IEs OPTIONAL

}

UE-EUTRA-Capability-v1390-IEs ::= SEQUENCE {

 rf-Parameters-v1390 RF-Parameters-v1390 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v13e0a-IEs OPTIONAL

}

UE-EUTRA-Capability-v13e0a-IEs ::= SEQUENCE {

 lateNonCriticalExtension OCTET STRING (CONTAINING UE-EUTRA-Capability-v13e0b-IEs) OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1470-IEs OPTIONAL

}

UE-EUTRA-Capability-v13e0b-IEs ::= SEQUENCE {

 phyLayerParameters-v13e0 PhyLayerParameters-v13e0,

 -- Following field is only to be used for late REL-13 extensions

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

UE-EUTRA-Capability-v1470-IEs ::= SEQUENCE {

 mbms-Parameters-v1470 MBMS-Parameters-v1470 OPTIONAL,

 phyLayerParameters-v1470 PhyLayerParameters-v1470 OPTIONAL,

 rf-Parameters-v1470 RF-Parameters-v1470 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v14a0-IEs OPTIONAL

}

UE-EUTRA-Capability-v14a0-IEs ::= SEQUENCE {

 phyLayerParameters-v14a0 PhyLayerParameters-v14a0,

 -- Following field is only to be used for late REL-14 extensions

 nonCriticalExtension UE-EUTRA-Capability-v14b0-IEs OPTIONAL

}

UE-EUTRA-Capability-v14b0-IEs ::= SEQUENCE {

 rf-Parameters-v14b0 RF-Parameters-v14b0 OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- Regular non critical extensions

UE-EUTRA-Capability-v920-IEs ::= SEQUENCE {

 phyLayerParameters-v920 PhyLayerParameters-v920,

 interRAT-ParametersGERAN-v920 IRAT-ParametersGERAN-v920,

 interRAT-ParametersUTRA-v920 IRAT-ParametersUTRA-v920 OPTIONAL,

 interRAT-ParametersCDMA2000-v920 IRAT-ParametersCDMA2000-1XRTT-v920 OPTIONAL,

 deviceType-r9 ENUMERATED {noBenFromBatConsumpOpt} OPTIONAL,

 csg-ProximityIndicationParameters-r9 CSG-ProximityIndicationParameters-r9,

 neighCellSI-AcquisitionParameters-r9 NeighCellSI-AcquisitionParameters-r9,

 son-Parameters-r9 SON-Parameters-r9,

 nonCriticalExtension UE-EUTRA-Capability-v940-IEs OPTIONAL

}

UE-EUTRA-Capability-v940-IEs ::= SEQUENCE {

 lateNonCriticalExtension OCTET STRING (CONTAINING UE-EUTRA-Capability-v9a0-IEs) OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1020-IEs OPTIONAL

}

UE-EUTRA-Capability-v1020-IEs ::= SEQUENCE {

 ue-Category-v1020 INTEGER (6..8) OPTIONAL,

 phyLayerParameters-v1020 PhyLayerParameters-v1020 OPTIONAL,

 rf-Parameters-v1020 RF-Parameters-v1020 OPTIONAL,

 measParameters-v1020 MeasParameters-v1020 OPTIONAL,

 featureGroupIndRel10-r10 BIT STRING (SIZE (32)) OPTIONAL,

 interRAT-ParametersCDMA2000-v1020 IRAT-ParametersCDMA2000-1XRTT-v1020 OPTIONAL,

 ue-BasedNetwPerfMeasParameters-r10 UE-BasedNetwPerfMeasParameters-r10 OPTIONAL,

 interRAT-ParametersUTRA-TDD-v1020 IRAT-ParametersUTRA-TDD-v1020 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1060-IEs OPTIONAL

}

UE-EUTRA-Capability-v1060-IEs ::= SEQUENCE {

 fdd-Add-UE-EUTRA-Capabilities-v1060 UE-EUTRA-CapabilityAddXDD-Mode-v1060 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v1060 UE-EUTRA-CapabilityAddXDD-Mode-v1060 OPTIONAL,

 rf-Parameters-v1060 RF-Parameters-v1060 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1090-IEs OPTIONAL

}

UE-EUTRA-Capability-v1090-IEs ::= SEQUENCE {

 rf-Parameters-v1090 RF-Parameters-v1090 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1130-IEs OPTIONAL

}

UE-EUTRA-Capability-v1130-IEs ::= SEQUENCE {

 pdcp-Parameters-v1130 PDCP-Parameters-v1130,

 phyLayerParameters-v1130 PhyLayerParameters-v1130 OPTIONAL,

 rf-Parameters-v1130 RF-Parameters-v1130,

 measParameters-v1130 MeasParameters-v1130,

 interRAT-ParametersCDMA2000-v1130 IRAT-ParametersCDMA2000-v1130,

 otherParameters-r11 Other-Parameters-r11,

 fdd-Add-UE-EUTRA-Capabilities-v1130 UE-EUTRA-CapabilityAddXDD-Mode-v1130 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v1130 UE-EUTRA-CapabilityAddXDD-Mode-v1130 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1170-IEs OPTIONAL

}

UE-EUTRA-Capability-v1170-IEs ::= SEQUENCE {

 phyLayerParameters-v1170 PhyLayerParameters-v1170 OPTIONAL,

 ue-Category-v1170 INTEGER (9..10) OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1180-IEs OPTIONAL

}

UE-EUTRA-Capability-v1180-IEs ::= SEQUENCE {

 rf-Parameters-v1180 RF-Parameters-v1180 OPTIONAL,

 mbms-Parameters-r11 MBMS-Parameters-r11 OPTIONAL,

 fdd-Add-UE-EUTRA-Capabilities-v1180 UE-EUTRA-CapabilityAddXDD-Mode-v1180 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v1180 UE-EUTRA-CapabilityAddXDD-Mode-v1180 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v11a0-IEs OPTIONAL

}

UE-EUTRA-Capability-v11a0-IEs ::= SEQUENCE {

 ue-Category-v11a0 INTEGER (11..12) OPTIONAL,

 measParameters-v11a0 MeasParameters-v11a0 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1250-IEs OPTIONAL

}

UE-EUTRA-Capability-v1250-IEs ::= SEQUENCE {

 phyLayerParameters-v1250 PhyLayerParameters-v1250 OPTIONAL,

 rf-Parameters-v1250 RF-Parameters-v1250 OPTIONAL,

 rlc-Parameters-r12 RLC-Parameters-r12 OPTIONAL,

 ue-BasedNetwPerfMeasParameters-v1250 UE-BasedNetwPerfMeasParameters-v1250 OPTIONAL,

 ue-CategoryDL-r12 INTEGER (0..14) OPTIONAL,

 ue-CategoryUL-r12 INTEGER (0..13) OPTIONAL,

 wlan-IW-Parameters-r12 WLAN-IW-Parameters-r12 OPTIONAL,

 measParameters-v1250 MeasParameters-v1250 OPTIONAL,

 dc-Parameters-r12 DC-Parameters-r12 OPTIONAL,

 mbms-Parameters-v1250 MBMS-Parameters-v1250 OPTIONAL,

 mac-Parameters-r12 MAC-Parameters-r12 OPTIONAL,

 fdd-Add-UE-EUTRA-Capabilities-v1250 UE-EUTRA-CapabilityAddXDD-Mode-v1250 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v1250 UE-EUTRA-CapabilityAddXDD-Mode-v1250 OPTIONAL,

 sl-Parameters-r12 SL-Parameters-r12 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1260-IEs OPTIONAL

}

UE-EUTRA-Capability-v1260-IEs ::= SEQUENCE {

 ue-CategoryDL-v1260 INTEGER (15..16) OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1270-IEs OPTIONAL

}

UE-EUTRA-Capability-v1270-IEs ::= SEQUENCE {

 rf-Parameters-v1270 RF-Parameters-v1270 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1280-IEs OPTIONAL

}

UE-EUTRA-Capability-v1280-IEs ::= SEQUENCE {

 phyLayerParameters-v1280 PhyLayerParameters-v1280 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1310-IEs OPTIONAL

}

UE-EUTRA-Capability-v1310-IEs ::= SEQUENCE {

 ue-CategoryDL-v1310 ENUMERATED {n17, m1} OPTIONAL,

 ue-CategoryUL-v1310 ENUMERATED {n14, m1} OPTIONAL,

 pdcp-Parameters-v1310 PDCP-Parameters-v1310,

 rlc-Parameters-v1310 RLC-Parameters-v1310,

 mac-Parameters-v1310 MAC-Parameters-v1310 OPTIONAL,

 phyLayerParameters-v1310 PhyLayerParameters-v1310 OPTIONAL,

 rf-Parameters-v1310 RF-Parameters-v1310 OPTIONAL,

 measParameters-v1310 MeasParameters-v1310 OPTIONAL,

 dc-Parameters-v1310 DC-Parameters-v1310 OPTIONAL,

 sl-Parameters-v1310 SL-Parameters-v1310 OPTIONAL,

 scptm-Parameters-r13 SCPTM-Parameters-r13 OPTIONAL,

 ce-Parameters-r13 CE-Parameters-r13 OPTIONAL,

 interRAT-ParametersWLAN-r13IRAT-ParametersWLAN-r13,

 laa-Parameters-r13 LAA-Parameters-r13 OPTIONAL,

 lwa-Parameters-r13 LWA-Parameters-r13 OPTIONAL,

 wlan-IW-Parameters-v1310 WLAN-IW-Parameters-v1310,

 lwip-Parameters-r13 LWIP-Parameters-r13,

 fdd-Add-UE-EUTRA-Capabilities-v1310 UE-EUTRA-CapabilityAddXDD-Mode-v1310 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v1310 UE-EUTRA-CapabilityAddXDD-Mode-v1310 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1320-IEs OPTIONAL

}

UE-EUTRA-Capability-v1320-IEs ::= SEQUENCE {

 ce-Parameters-v1320 CE-Parameters-v1320 OPTIONAL,

 phyLayerParameters-v1320 PhyLayerParameters-v1320 OPTIONAL,

 rf-Parameters-v1320 RF-Parameters-v1320 OPTIONAL,

 fdd-Add-UE-EUTRA-Capabilities-v1320 UE-EUTRA-CapabilityAddXDD-Mode-v1320 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v1320 UE-EUTRA-CapabilityAddXDD-Mode-v1320 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1330-IEs OPTIONAL

}

UE-EUTRA-Capability-v1330-IEs ::= SEQUENCE {

 ue-CategoryDL-v1330 INTEGER (18..19) OPTIONAL,

 phyLayerParameters-v1330 PhyLayerParameters-v1330 OPTIONAL,

 ue-CE-NeedULGaps-r13 ENUMERATED {true} OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1340-IEs OPTIONAL

}

UE-EUTRA-Capability-v1340-IEs ::= SEQUENCE {

 ue-CategoryUL-v1340 INTEGER (15) OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1350-IEs OPTIONAL

}

UE-EUTRA-Capability-v1350-IEs ::= SEQUENCE {

 ue-CategoryDL-v1350 ENUMERATED {oneBis} OPTIONAL,

 ue-CategoryUL-v1350 ENUMERATED {oneBis} OPTIONAL,

 ce-Parameters-v1350 CE-Parameters-v1350,

 nonCriticalExtension UE-EUTRA-Capability-v1360-IEs OPTIONAL

}

UE-EUTRA-Capability-v1360-IEs ::= SEQUENCE {

 other-Parameters-v1360 Other-Parameters-v1360 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1430-IEs OPTIONAL

}

UE-EUTRA-Capability-v1430-IEs ::= SEQUENCE {

 phyLayerParameters-v1430 PhyLayerParameters-v1430,

 ue-CategoryDL-v1430 ENUMERATED {m2} OPTIONAL,

 ue-CategoryUL-v1430 ENUMERATED {n16, n17, n18, n19, n20, m2} OPTIONAL,

 ue-CategoryUL-v1430b ENUMERATED {n21} OPTIONAL,

 mac-Parameters-v1430 MAC-Parameters-v1430 OPTIONAL,

 measParameters-v1430 MeasParameters-v1430 OPTIONAL,

 pdcp-Parameters-v1430 PDCP-Parameters-v1430 OPTIONAL,

 rlc-Parameters-v1430 RLC-Parameters-v1430,

 rf-Parameters-v1430 RF-Parameters-v1430 OPTIONAL,

 laa-Parameters-v1430 LAA-Parameters-v1430 OPTIONAL,

 lwa-Parameters-v1430 LWA-Parameters-v1430 OPTIONAL,

 lwip-Parameters-v1430 LWIP-Parameters-v1430 OPTIONAL,

 otherParameters-v1430 Other-Parameters-v1430,

 mmtel-Parameters-r14 MMTEL-Parameters-r14 OPTIONAL,

 mobilityParameters-r14 MobilityParameters-r14 OPTIONAL,

 ce-Parameters-v1430 CE-Parameters-v1430,

 fdd-Add-UE-EUTRA-Capabilities-v1430 UE-EUTRA-CapabilityAddXDD-Mode-v1430 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v1430 UE-EUTRA-CapabilityAddXDD-Mode-v1430 OPTIONAL,

 mbms-Parameters-v1430 MBMS-Parameters-v1430 OPTIONAL,

 sl-Parameters-v1430 SL-Parameters-v1430 OPTIONAL,

 ue-BasedNetwPerfMeasParameters-v1430 UE-BasedNetwPerfMeasParameters-v1430 OPTIONAL,

 highSpeedEnhParameters-r14 HighSpeedEnhParameters-r14 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1440-IEs OPTIONAL

}

UE-EUTRA-Capability-v1440-IEs ::= SEQUENCE {

 lwa-Parameters-v1440 LWA-Parameters-v1440,

 mac-Parameters-v1440 MAC-Parameters-v1440,

 nonCriticalExtension UE-EUTRA-Capability-v1450-IEs OPTIONAL

}

UE-EUTRA-Capability-v1450-IEs ::= SEQUENCE {

 phyLayerParameters-v1450 PhyLayerParameters-v1450 OPTIONAL,

 rf-Parameters-v1450 RF-Parameters-v1450 OPTIONAL,

 otherParameters-v1450 OtherParameters-v1450,

 ue-CategoryDL-v1450 INTEGER (20) OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1460-IEs OPTIONAL

}

UE-EUTRA-Capability-v1460-IEs ::= SEQUENCE {

 ue-CategoryDL-v1460 INTEGER (21) OPTIONAL,

 otherParameters-v1460 Other-Parameters-v1460,

 nonCriticalExtension UE-EUTRA-Capability-v1510-IEs OPTIONAL

}

UE-EUTRA-Capability-v1510-IEs ::= SEQUENCE {

 irat-ParametersNR-r15 IRAT-ParametersNR-r15 OPTIONAL,

 featureSetsEUTRA-r15 FeatureSetsEUTRA-r15 OPTIONAL,

 pdcp-ParametersNR-r15 PDCP-ParametersNR-r15 OPTIONAL,

 fdd-Add-UE-EUTRA-Capabilities-v1510 UE-EUTRA-CapabilityAddXDD-Mode-v1510 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v1510 UE-EUTRA-CapabilityAddXDD-Mode-v1510 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1520-IEs OPTIONAL

}

UE-EUTRA-Capability-v1520-IEs ::= SEQUENCE {

 measParameters-v1520 MeasParameters-v1520,

 nonCriticalExtension UE-EUTRA-Capability-v1530-IEs OPTIONAL

}

UE-EUTRA-Capability-v1530-IEs ::= SEQUENCE {

 measParameters-v1530 MeasParameters-v1530 OPTIONAL,

 otherParameters-v1530 Other-Parameters-v1530 OPTIONAL,

 neighCellSI-AcquisitionParameters-v1530 NeighCellSI-AcquisitionParameters-v1530 OPTIONAL,

 mac-Parameters-v1530 MAC-Parameters-v1530 OPTIONAL,

 phyLayerParameters-v1530 PhyLayerParameters-v1530 OPTIONAL,

 rf-Parameters-v1530 RF-Parameters-v1530 OPTIONAL,

 pdcp-Parameters-v1530 PDCP-Parameters-v1530 OPTIONAL,

 ue-CategoryDL-v1530 INTEGER (22..26) OPTIONAL,

 ue-BasedNetwPerfMeasParameters-v1530 UE-BasedNetwPerfMeasParameters-v1530 OPTIONAL,

 rlc-Parameters-v1530 RLC-Parameters-v1530 OPTIONAL,

 sl-Parameters-v1530 SL-Parameters-v1530 OPTIONAL,

 extendedNumberOfDRBs-r15 ENUMERATED {supported} OPTIONAL,

 reducedCP-Latency-r15 ENUMERATED {supported} OPTIONAL,

 laa-Parameters-v1530 LAA-Parameters-v1530 OPTIONAL,

 ue-CategoryUL-v1530 INTEGER (22..26) OPTIONAL,

 fdd-Add-UE-EUTRA-Capabilities-v1530 UE-EUTRA-CapabilityAddXDD-Mode-v1530 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v1530 UE-EUTRA-CapabilityAddXDD-Mode-v1530 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1540-IEs OPTIONAL

}

UE-EUTRA-Capability-v1540-IEs ::= SEQUENCE {

 phyLayerParameters-v1540 PhyLayerParameters-v1540 OPTIONAL,

 otherParameters-v1540 Other-Parameters-v1540,

 fdd-Add-UE-EUTRA-Capabilities-v1540 UE-EUTRA-CapabilityAddXDD-Mode-v1540 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v1540 UE-EUTRA-CapabilityAddXDD-Mode-v1540 OPTIONAL,

 sl-Parameters-v1540 SL-Parameters-v1540 OPTIONAL,

 irat-ParametersNR-v1540 IRAT-ParametersNR-v1540 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v1550-IEs OPTIONAL

}

UE-EUTRA-Capability-v1550-IEs ::= SEQUENCE {

 neighCellSI-AcquisitionParameters-v1550 NeighCellSI-AcquisitionParameters-v1550 OPTIONAL,

 phyLayerParameters-v1550 PhyLayerParameters-v1550,

 mac-Parameters-v1550 MAC-Parameters-v1550,

 fdd-Add-UE-EUTRA-Capabilities-v1550 UE-EUTRA-CapabilityAddXDD-Mode-v1550,

 tdd-Add-UE-EUTRA-Capabilities-v1550 UE-EUTRA-CapabilityAddXDD-Mode-v1550,

 nonCriticalExtension UE-EUTRA-Capability-v1560-IEs OPTIONAL

}

UE-EUTRA-Capability-v1560-IEs ::= SEQUENCE {

 pdcp-ParametersNR-v1560 PDCP-ParametersNR-v1560,

 irat-ParametersNR-v1560 IRAT-ParametersNR-v1560,

 appliedCapabilityFilterCommon-r15 OCTET STRING OPTIONAL,

 fdd-Add-UE-EUTRA-Capabilities-v1560 UE-EUTRA-CapabilityAddXDD-Mode-v1560,

 tdd-Add-UE-EUTRA-Capabilities-v1560 UE-EUTRA-CapabilityAddXDD-Mode-v1560,

 nonCriticalExtension UE-EUTRA-Capability-v1570-IEs OPTIONAL

}

UE-EUTRA-Capability-v1570-IEs ::= SEQUENCE {

 rf-Parameters-v1570 RF-Parameters-v1570 OPTIONAL,

 irat-ParametersNR-v1570 IRAT-ParametersNR-v1570 OPTIONAL,

 nonCriticalExtension UE-EUTRA-Capability-v16x0-IEs OPTIONAL

}

UE-EUTRA-Capability-v16x0-IEs ::= SEQUENCE {

 rf-Parameters-v16x0 RF-Parameters-v16x0 OPTIONAL,

 mobilityParameters-r16 MobilityParameters-r16 OPTIONAL,

 fdd-Add-UE-EUTRA-Capabilities-v16x0 UE-EUTRA-CapabilityAddXDD-Mode-v16x0 OPTIONAL,

 tdd-Add-UE-EUTRA-Capabilities-v16x0 UE-EUTRA-CapabilityAddXDD-Mode-v16x0 OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

UE-EUTRA-CapabilityAddXDD-Mode-r9 ::= SEQUENCE {

 phyLayerParameters-r9 PhyLayerParameters OPTIONAL,

 featureGroupIndicators-r9 BIT STRING (SIZE (32)) OPTIONAL,

 featureGroupIndRel9Add-r9 BIT STRING (SIZE (32)) OPTIONAL,

 interRAT-ParametersGERAN-r9 IRAT-ParametersGERAN OPTIONAL,

 interRAT-ParametersUTRA-r9 IRAT-ParametersUTRA-v920 OPTIONAL,

 interRAT-ParametersCDMA2000-r9 IRAT-ParametersCDMA2000-1XRTT-v920 OPTIONAL,

 neighCellSI-AcquisitionParameters-r9 NeighCellSI-AcquisitionParameters-r9 OPTIONAL,

 ...

}

UE-EUTRA-CapabilityAddXDD-Mode-v1060 ::= SEQUENCE {

 phyLayerParameters-v1060 PhyLayerParameters-v1020 OPTIONAL,

 featureGroupIndRel10-v1060 BIT STRING (SIZE (32)) OPTIONAL,

 interRAT-ParametersCDMA2000-v1060 IRAT-ParametersCDMA2000-1XRTT-v1020 OPTIONAL,

 interRAT-ParametersUTRA-TDD-v1060 IRAT-ParametersUTRA-TDD-v1020 OPTIONAL,

 ...,

 [[ otdoa-PositioningCapabilities-r10 OTDOA-PositioningCapabilities-r10 OPTIONAL

 ]]

}

UE-EUTRA-CapabilityAddXDD-Mode-v1130 ::= SEQUENCE {

 phyLayerParameters-v1130 PhyLayerParameters-v1130 OPTIONAL,

 measParameters-v1130 MeasParameters-v1130 OPTIONAL,

 otherParameters-r11 Other-Parameters-r11 OPTIONAL,

 ...

}

UE-EUTRA-CapabilityAddXDD-Mode-v1180 ::= SEQUENCE {

 mbms-Parameters-r11 MBMS-Parameters-r11

}

UE-EUTRA-CapabilityAddXDD-Mode-v1250 ::= SEQUENCE {

 phyLayerParameters-v1250 PhyLayerParameters-v1250 OPTIONAL,

 measParameters-v1250 MeasParameters-v1250 OPTIONAL

}

UE-EUTRA-CapabilityAddXDD-Mode-v1310 ::= SEQUENCE {

 phyLayerParameters-v1310 PhyLayerParameters-v1310 OPTIONAL

}

UE-EUTRA-CapabilityAddXDD-Mode-v1320 ::= SEQUENCE {

 phyLayerParameters-v1320 PhyLayerParameters-v1320 OPTIONAL,

 scptm-Parameters-r13 SCPTM-Parameters-r13 OPTIONAL

}

UE-EUTRA-CapabilityAddXDD-Mode-v1370 ::= SEQUENCE {

 ce-Parameters-v1370 CE-Parameters-v1370 OPTIONAL

}

UE-EUTRA-CapabilityAddXDD-Mode-v1380 ::= SEQUENCE {

 ce-Parameters-v1380 CE-Parameters-v1380

}

UE-EUTRA-CapabilityAddXDD-Mode-v1430 ::= SEQUENCE {

 phyLayerParameters-v1430 PhyLayerParameters-v1430 OPTIONAL,

 mmtel-Parameters-r14 MMTEL-Parameters-r14 OPTIONAL

}

UE-EUTRA-CapabilityAddXDD-Mode-v1510 ::= SEQUENCE {

 pdcp-ParametersNR-r15 PDCP-ParametersNR-r15 OPTIONAL

}

UE-EUTRA-CapabilityAddXDD-Mode-v1530 ::= SEQUENCE {

 neighCellSI-AcquisitionParameters-v1530 NeighCellSI-AcquisitionParameters-v1530 OPTIONAL,

 reducedCP-Latency-r15 ENUMERATED {supported} OPTIONAL

}

UE-EUTRA-CapabilityAddXDD-Mode-v1540 ::= SEQUENCE {

 eutra-5GC-Parameters-r15 EUTRA-5GC-Parameters-r15 OPTIONAL,

 irat-ParametersNR-v1540 IRAT-ParametersNR-v1540 OPTIONAL

}

UE-EUTRA-CapabilityAddXDD-Mode-v1550 ::= SEQUENCE {

 neighCellSI-AcquisitionParameters-v1550 NeighCellSI-AcquisitionParameters-v1550 OPTIONAL

}

UE-EUTRA-CapabilityAddXDD-Mode-v1560 ::= SEQUENCE {

 pdcp-ParametersNR-v1560 PDCP-ParametersNR-v1560

}

UE-EUTRA-CapabilityAddXDD-Mode-v16x0 ::= SEQUENCE {

 mobilityParameters-r16 MobilityParameters-r16 OPTIONAL

}

AccessStratumRelease ::= ENUMERATED {

 rel8, rel9, rel10, rel11, rel12, rel13,

 rel14, rel15, ...}

FeatureSetsEUTRA-r15 ::= SEQUENCE {

 featureSetsDL-r15 SEQUENCE (SIZE (1..maxFeatureSets-r15)) OF FeatureSetDL-r15 OPTIONAL,

 featureSetsDL-PerCC-r15 SEQUENCE (SIZE (1..maxPerCC-FeatureSets-r15)) OF FeatureSetDL-PerCC-r15 OPTIONAL,

 featureSetsUL-r15 SEQUENCE (SIZE (1..maxFeatureSets-r15)) OF FeatureSetUL-r15 OPTIONAL,

 featureSetsUL-PerCC-r15 SEQUENCE (SIZE (1..maxPerCC-FeatureSets-r15)) OF FeatureSetUL-PerCC-r15 OPTIONAL,

 ...,

 [[ featureSetsDL-v1550 SEQUENCE (SIZE (1..maxFeatureSets-r15)) OF FeatureSetDL-v1550 OPTIONAL

 ]]

}

MobilityParameters-r14 ::= SEQUENCE {

 makeBeforeBreak-r14 ENUMERATED {supported} OPTIONAL,

 rach-Less-r14 ENUMERATED {supported} OPTIONAL

}

MobilityParameters-r16 ::= SEQUENCE {

 cho-r16 ENUMERATED {supported} OPTIONAL,

 choFDD-TDD-r16 ENUMERATED {supported} OPTIONAL,

 cho-Failure-r16 ENUMERATED {supported} OPTIONAL,

 cho-MaxCells-r16 INTEGER (2..8) OPTIONAL,--FFS

 twoTriggerEvents-r16 ENUMERATED {supported} OPTIONAL-- FFS

}

DC-Parameters-r12 ::= SEQUENCE {

 drb-TypeSplit-r12 ENUMERATED {supported} OPTIONAL,

 drb-TypeSCG-r12 ENUMERATED {supported} OPTIONAL

}

DC-Parameters-v1310 ::= SEQUENCE {

 pdcp-TransferSplitUL-r13 ENUMERATED {supported} OPTIONAL,

 ue-SSTD-Meas-r13 ENUMERATED {supported} OPTIONAL

}

MAC-Parameters-r12 ::= SEQUENCE {

 logicalChannelSR-ProhibitTimer-r12 ENUMERATED {supported} OPTIONAL,

 longDRX-Command-r12 ENUMERATED {supported} OPTIONAL

}

MAC-Parameters-v1310 ::= SEQUENCE {

 extendedMAC-LengthField-r13 ENUMERATED {supported} OPTIONAL,

 extendedLongDRX-r13 ENUMERATED {supported} OPTIONAL

}

MAC-Parameters-v1430 ::= SEQUENCE {

 shortSPS-IntervalFDD-r14 ENUMERATED {supported} OPTIONAL,

 shortSPS-IntervalTDD-r14 ENUMERATED {supported} OPTIONAL,

 skipUplinkDynamic-r14 ENUMERATED {supported} OPTIONAL,

 skipUplinkSPS-r14 ENUMERATED {supported} OPTIONAL,

 multipleUplinkSPS-r14 ENUMERATED {supported} OPTIONAL,

 dataInactMon-r14 ENUMERATED {supported} OPTIONAL

}

MAC-Parameters-v1440 ::= SEQUENCE {

 rai-Support-r14 ENUMERATED {supported} OPTIONAL

}

MAC-Parameters-v1530 ::= SEQUENCE {

 min-Proc-TimelineSubslot-r15 SEQUENCE (SIZE(1..3)) OF ProcessingTimelineSet-r15 OPTIONAL,

 skipSubframeProcessing-r15 SkipSubframeProcessing-r15 OPTIONAL,

 earlyData-UP-r15 ENUMERATED {supported} OPTIONAL,

 dormantSCellState-r15 ENUMERATED {supported} OPTIONAL,

 directSCellActivation-r15 ENUMERATED {supported} OPTIONAL,

 directSCellHibernation-r15 ENUMERATED {supported} OPTIONAL,

 extendedLCID-Duplication-r15 ENUMERATED {supported} OPTIONAL,

 sps-ServingCell-r15 ENUMERATED {supported} OPTIONAL

}

MAC-Parameters-v1550 ::= SEQUENCE {

 eLCID-Support-r15 ENUMERATED {supported} OPTIONAL

}

ProcessingTimelineSet-r15 ::= ENUMERATED {set1, set2}

RLC-Parameters-r12 ::= SEQUENCE {

 extended-RLC-LI-Field-r12 ENUMERATED {supported}

}

RLC-Parameters-v1310 ::= SEQUENCE {

 extendedRLC-SN-SO-Field-r13 ENUMERATED {supported} OPTIONAL

}

RLC-Parameters-v1430 ::= SEQUENCE {

 extendedPollByte-r14 ENUMERATED {supported} OPTIONAL

}

RLC-Parameters-v1530 ::= SEQUENCE {

 flexibleUM-AM-Combinations-r15 ENUMERATED {supported} OPTIONAL,

 rlc-AM-Ooo-Delivery-r15 ENUMERATED {supported} OPTIONAL,

 rlc-UM-Ooo-Delivery-r15 ENUMERATED {supported} OPTIONAL

}

PDCP-Parameters ::= SEQUENCE {

 supportedROHC-Profiles ROHC-ProfileSupportList-r15,

 maxNumberROHC-ContextSessions ENUMERATED {

 cs2, cs4, cs8, cs12, cs16, cs24, cs32,

 cs48, cs64, cs128, cs256, cs512, cs1024,

 cs16384, spare2, spare1} DEFAULT cs16,

 ...

}

PDCP-Parameters-v1130 ::= SEQUENCE {

 pdcp-SN-Extension-r11 ENUMERATED {supported} OPTIONAL,

 supportRohcContextContinue-r11 ENUMERATED {supported} OPTIONAL

}

PDCP-Parameters-v1310 ::= SEQUENCE {

 pdcp-SN-Extension-18bits-r13 ENUMERATED {supported} OPTIONAL

}

PDCP-Parameters-v1430 ::= SEQUENCE {

 supportedUplinkOnlyROHC-Profiles-r14 SEQUENCE {

 profile0x0006-r14 BOOLEAN

 },

 maxNumberROHC-ContextSessions-r14 ENUMERATED {

 cs2, cs4, cs8, cs12, cs16, cs24, cs32,

 cs48, cs64, cs128, cs256, cs512, cs1024,

 cs16384, spare2, spare1} DEFAULT cs16

}

PDCP-Parameters-v1530 ::= SEQUENCE {

 supportedUDC-r15 SupportedUDC-r15 OPTIONAL,

 pdcp-Duplication-r15 ENUMERATED {supported} OPTIONAL

}

SupportedUDC-r15 ::= SEQUENCE {

 supportedStandardDic-r15 ENUMERATED {supported} OPTIONAL,

 supportedOperatorDic-r15 SupportedOperatorDic-r15 OPTIONAL

}

SupportedOperatorDic-r15 ::= SEQUENCE {

 versionOfDictionary-r15 INTEGER (0..15),

 associatedPLMN-ID-r15 PLMN-Identity

}

PhyLayerParameters ::= SEQUENCE {

 ue-TxAntennaSelectionSupported BOOLEAN,

 ue-SpecificRefSigsSupported BOOLEAN

}

PhyLayerParameters-v920 ::= SEQUENCE {

 enhancedDualLayerFDD-r9 ENUMERATED {supported} OPTIONAL,

 enhancedDualLayerTDD-r9 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-v9d0 ::= SEQUENCE {

 tm5-FDD-r9 ENUMERATED {supported} OPTIONAL,

 tm5-TDD-r9 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-v1020 ::= SEQUENCE {

 twoAntennaPortsForPUCCH-r10 ENUMERATED {supported} OPTIONAL,

 tm9-With-8Tx-FDD-r10 ENUMERATED {supported} OPTIONAL,

 pmi-Disabling-r10 ENUMERATED {supported} OPTIONAL,

 crossCarrierScheduling-r10 ENUMERATED {supported} OPTIONAL,

 simultaneousPUCCH-PUSCH-r10 ENUMERATED {supported} OPTIONAL,

 multiClusterPUSCH-WithinCC-r10 ENUMERATED {supported} OPTIONAL,

 nonContiguousUL-RA-WithinCC-List-r10 NonContiguousUL-RA-WithinCC-List-r10 OPTIONAL

}

PhyLayerParameters-v1130 ::= SEQUENCE {

 crs-InterfHandl-r11 ENUMERATED {supported} OPTIONAL,

 ePDCCH-r11 ENUMERATED {supported} OPTIONAL,

 multiACK-CSI-Reporting-r11 ENUMERATED {supported} OPTIONAL,

 ss-CCH-InterfHandl-r11 ENUMERATED {supported} OPTIONAL,

 tdd-SpecialSubframe-r11 ENUMERATED {supported} OPTIONAL,

 txDiv-PUCCH1b-ChSelect-r11 ENUMERATED {supported} OPTIONAL,

 ul-CoMP-r11 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-v1170 ::= SEQUENCE {

 interBandTDD-CA-WithDifferentConfig-r11 BIT STRING (SIZE (2)) OPTIONAL

}

PhyLayerParameters-v1250 ::= SEQUENCE {

 e-HARQ-Pattern-FDD-r12 ENUMERATED {supported} OPTIONAL,

 enhanced-4TxCodebook-r12 ENUMERATED {supported} OPTIONAL,

 tdd-FDD-CA-PCellDuplex-r12 BIT STRING (SIZE (2)) OPTIONAL,

 phy-TDD-ReConfig-TDD-PCell-r12 ENUMERATED {supported} OPTIONAL,

 phy-TDD-ReConfig-FDD-PCell-r12 ENUMERATED {supported} OPTIONAL,

 pusch-FeedbackMode-r12 ENUMERATED {supported} OPTIONAL,

 pusch-SRS-PowerControl-SubframeSet-r12 ENUMERATED {supported} OPTIONAL,

 csi-SubframeSet-r12 ENUMERATED {supported} OPTIONAL,

 noResourceRestrictionForTTIBundling-r12 ENUMERATED {supported} OPTIONAL,

 discoverySignalsInDeactSCell-r12 ENUMERATED {supported} OPTIONAL,

 naics-Capability-List-r12 NAICS-Capability-List-r12 OPTIONAL

}

PhyLayerParameters-v1280 ::= SEQUENCE {

 alternativeTBS-Indices-r12 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-v1310 ::= SEQUENCE {

 aperiodicCSI-Reporting-r13 BIT STRING (SIZE (2)) OPTIONAL,

 codebook-HARQ-ACK-r13 BIT STRING (SIZE (2)) OPTIONAL,

 crossCarrierScheduling-B5C-r13 ENUMERATED {supported} OPTIONAL,

 fdd-HARQ-TimingTDD-r13 ENUMERATED {supported} OPTIONAL,

 maxNumberUpdatedCSI-Proc-r13 INTEGER(5..32) OPTIONAL,

 pucch-Format4-r13 ENUMERATED {supported} OPTIONAL,

 pucch-Format5-r13 ENUMERATED {supported} OPTIONAL,

 pucch-SCell-r13 ENUMERATED {supported} OPTIONAL,

 spatialBundling-HARQ-ACK-r13 ENUMERATED {supported} OPTIONAL,

 supportedBlindDecoding-r13 SEQUENCE {

 maxNumberDecoding-r13 INTEGER(1..32) OPTIONAL,

 pdcch-CandidateReductions-r13 ENUMERATED {supported} OPTIONAL,

 skipMonitoringDCI-Format0-1A-r13 ENUMERATED {supported} OPTIONAL

 } OPTIONAL,

 uci-PUSCH-Ext-r13 ENUMERATED {supported} OPTIONAL,

 crs-InterfMitigationTM10-r13 ENUMERATED {supported} OPTIONAL,

 pdsch-CollisionHandling-r13 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-v1320 ::= SEQUENCE {

 mimo-UE-Parameters-r13 MIMO-UE-Parameters-r13 OPTIONAL

}

PhyLayerParameters-v1330 ::= SEQUENCE {

 cch-InterfMitigation-RefRecTypeA-r13 ENUMERATED {supported} OPTIONAL,

 cch-InterfMitigation-RefRecTypeB-r13 ENUMERATED {supported} OPTIONAL,

 cch-InterfMitigation-MaxNumCCs-r13 INTEGER (1.. maxServCell-r13) OPTIONAL,

 crs-InterfMitigationTM1toTM9-r13 INTEGER (1.. maxServCell-r13) OPTIONAL

}

PhyLayerParameters-v13e0 ::= SEQUENCE {

 mimo-UE-Parameters-v13e0 MIMO-UE-Parameters-v13e0

}

PhyLayerParameters-v1430 ::= SEQUENCE {

 ce-PUSCH-NB-MaxTBS-r14 ENUMERATED {supported} OPTIONAL,

 ce-PDSCH-PUSCH-MaxBandwidth-r14 ENUMERATED {bw5, bw20} OPTIONAL,

 ce-HARQ-AckBundling-r14 ENUMERATED {supported} OPTIONAL,

 ce-PDSCH-TenProcesses-r14 ENUMERATED {supported} OPTIONAL,

 ce-RetuningSymbols-r14 ENUMERATED {n0, n1} OPTIONAL,

 ce-PDSCH-PUSCH-Enhancement-r14 ENUMERATED {supported} OPTIONAL,

 ce-SchedulingEnhancement-r14 ENUMERATED {supported} OPTIONAL,

 ce-SRS-Enhancement-r14 ENUMERATED {supported} OPTIONAL,

 ce-PUCCH-Enhancement-r14 ENUMERATED {supported} OPTIONAL,

 ce-ClosedLoopTxAntennaSelection-r14 ENUMERATED {supported} OPTIONAL,

 tdd-SpecialSubframe-r14 ENUMERATED {supported} OPTIONAL,

 tdd-TTI-Bundling-r14 ENUMERATED {supported} OPTIONAL,

 dmrs-LessUpPTS-r14 ENUMERATED {supported} OPTIONAL,

 mimo-UE-Parameters-v1430 MIMO-UE-Parameters-v1430 OPTIONAL,

 alternativeTBS-Index-r14 ENUMERATED {supported} OPTIONAL,

 feMBMS-Unicast-Parameters-r14 FeMBMS-Unicast-Parameters-r14 OPTIONAL

}

PhyLayerParameters-v1450 ::= SEQUENCE {

 ce-SRS-EnhancementWithoutComb4-r14 ENUMERATED {supported} OPTIONAL,

 crs-LessDwPTS-r14 ENUMERATED {supported} OPTIONAL}

PhyLayerParameters-v1470 ::= SEQUENCE {

 mimo-UE-Parameters-v1470 MIMO-UE-Parameters-v1470 OPTIONAL,

 srs-UpPTS-6sym-r14 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-v14a0 ::= SEQUENCE {

 ssp10-TDD-Only-r14 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-v1530 ::= SEQUENCE {

 stti-SPT-Capabilities-r15 SEQUENCE {

 aperiodicCsi-ReportingSTTI-r15 ENUMERATED {supported} OPTIONAL,

 dmrs-BasedSPDCCH-MBSFN-r15 ENUMERATED {supported} OPTIONAL,

 dmrs-BasedSPDCCH-nonMBSFN-r15 ENUMERATED {supported} OPTIONAL,

 dmrs-PositionPattern-r15 ENUMERATED {supported} OPTIONAL,

 dmrs-SharingSubslotPDSCH-r15 ENUMERATED {supported} OPTIONAL,

 dmrs-RepetitionSubslotPDSCH-r15 ENUMERATED {supported} OPTIONAL,

 epdcch-SPT-differentCells-r15 ENUMERATED {supported} OPTIONAL,

 epdcch-STTI-differentCells-r15 ENUMERATED {supported} OPTIONAL,

 maxLayersSlotOrSubslotPUSCH-r15 ENUMERATED {oneLayer,twoLayers,fourLayers}

 OPTIONAL,

 maxNumberUpdatedCSI-Proc-SPT-r15 INTEGER(5..32) OPTIONAL,

 maxNumberUpdatedCSI-Proc-STTI-Comb77-r15 INTEGER(1..32) OPTIONAL,

 maxNumberUpdatedCSI-Proc-STTI-Comb27-r15 INTEGER(1..32) OPTIONAL,

 maxNumberUpdatedCSI-Proc-STTI-Comb22-Set1-r15 INTEGER(1..32) OPTIONAL,

 maxNumberUpdatedCSI-Proc-STTI-Comb22-Set2-r15 INTEGER(1..32) OPTIONAL,

 mimo-UE-ParametersSTTI-r15 MIMO-UE-Parameters-r13 OPTIONAL,

 mimo-UE-ParametersSTTI-v1530 MIMO-UE-Parameters-v1430 OPTIONAL,

 numberOfBlindDecodesUSS-r15 INTEGER(4..32) OPTIONAL,

 pdsch-SlotSubslotPDSCH-Decoding-r15 ENUMERATED {supported} OPTIONAL,

 powerUCI-SlotPUSCH ENUMERATED {supported} OPTIONAL,

 powerUCI-SubslotPUSCH ENUMERATED {supported} OPTIONAL,

 slotPDSCH-TxDiv-TM9and10 ENUMERATED {supported} OPTIONAL,

 subslotPDSCH-TxDiv-TM9and10 ENUMERATED {supported} OPTIONAL,

 spdcch-differentRS-types-r15 ENUMERATED {supported} OPTIONAL,

 srs-DCI7-TriggeringFS2-r15 ENUMERATED {supported} OPTIONAL,

 sps-cyclicShift-r15 ENUMERATED {supported} OPTIONAL,

 spdcch-Reuse-r15 ENUMERATED {supported} OPTIONAL,

 sps-STTI-r15 ENUMERATED {slot, subslot, slotAndSubslot}

 OPTIONAL,

 tm8-slotPDSCH-r15 ENUMERATED {supported} OPTIONAL,

 tm9-slotSubslot-r15 ENUMERATED {supported} OPTIONAL,

 tm9-slotSubslotMBSFN-r15 ENUMERATED {supported} OPTIONAL,

 tm10-slotSubslot-r15 ENUMERATED {supported} OPTIONAL,

 tm10-slotSubslotMBSFN-r15 ENUMERATED {supported} OPTIONAL,

 txDiv-SPUCCH-r15 ENUMERATED {supported} OPTIONAL,

 ul-AsyncHarqSharingDiff-TTI-Lengths-r15 ENUMERATED {supported} OPTIONAL

 } OPTIONAL,

 ce-Capabilities-r15 SEQUENCE {

 ce-CRS-IntfMitig-r15 ENUMERATED {supported} OPTIONAL,

 ce-CQI-AlternativeTable-r15 ENUMERATED {supported} OPTIONAL,

 ce-PDSCH-FlexibleStartPRB-CE-ModeA-r15 ENUMERATED {supported} OPTIONAL,

 ce-PDSCH-FlexibleStartPRB-CE-ModeB-r15 ENUMERATED {supported} OPTIONAL,

 ce-PDSCH-64QAM-r15 ENUMERATED {supported} OPTIONAL,

 ce-PUSCH-FlexibleStartPRB-CE-ModeA-r15 ENUMERATED {supported} OPTIONAL,

 ce-PUSCH-FlexibleStartPRB-CE-ModeB-r15 ENUMERATED {supported} OPTIONAL,

 ce-PUSCH-SubPRB-Allocation-r15 ENUMERATED {supported} OPTIONAL,

 ce-UL-HARQ-ACK-Feedback-r15 ENUMERATED {supported} OPTIONAL

 } OPTIONAL,

 shortCQI-ForSCellActivation-r15 ENUMERATED {supported} OPTIONAL,

 mimo-CBSR-AdvancedCSI-r15 ENUMERATED {supported} OPTIONAL,

 crs-IntfMitig-r15 ENUMERATED {supported} OPTIONAL,

 ul-PowerControlEnhancements-r15 ENUMERATED {supported} OPTIONAL,

 urllc-Capabilities-r15 SEQUENCE {

 pdsch-RepSubframe-r15 ENUMERATED {supported} OPTIONAL,

 pdsch-RepSlot-r15 ENUMERATED {supported} OPTIONAL,

 pdsch-RepSubslot-r15 ENUMERATED {supported} OPTIONAL,

 pusch-SPS-MultiConfigSubframe-r15 INTEGER (0..6) OPTIONAL,

 pusch-SPS-MaxConfigSubframe-r15 INTEGER (0..31) OPTIONAL,

 pusch-SPS-MultiConfigSlot-r15 INTEGER (0..6) OPTIONAL,

 pusch-SPS-MaxConfigSlot-r15 INTEGER (0..31) OPTIONAL,

 pusch-SPS-MultiConfigSubslot-r15 INTEGER (0..6) OPTIONAL,

 pusch-SPS-MaxConfigSubslot-r15 INTEGER (0..31) OPTIONAL,

 pusch-SPS-SlotRepPCell-r15 ENUMERATED {supported} OPTIONAL,

 pusch-SPS-SlotRepPSCell-r15 ENUMERATED {supported} OPTIONAL,

 pusch-SPS-SlotRepSCell-r15 ENUMERATED {supported} OPTIONAL,

 pusch-SPS-SubframeRepPCell-r15 ENUMERATED {supported} OPTIONAL,

 pusch-SPS-SubframeRepPSCell-r15 ENUMERATED {supported} OPTIONAL,

 pusch-SPS-SubframeRepSCell-r15 ENUMERATED {supported} OPTIONAL,

 pusch-SPS-SubslotRepPCell-r15 ENUMERATED {supported} OPTIONAL,

 pusch-SPS-SubslotRepPSCell-r15 ENUMERATED {supported} OPTIONAL,

 pusch-SPS-SubslotRepSCell-r15 ENUMERATED {supported} OPTIONAL,

 semiStaticCFI-r15 ENUMERATED {supported} OPTIONAL,

 semiStaticCFI-Pattern-r15 ENUMERATED {supported} OPTIONAL

 } OPTIONAL,

 altMCS-Table-r15 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-v1540 ::= SEQUENCE {

 stti-SPT-Capabilities-v1540 SEQUENCE {

 slotPDSCH-TxDiv-TM8-r15 ENUMERATED {supported}

 } OPTIONAL,

 crs-IM-TM1-toTM9-OneRX-Port-v1540 ENUMERATED {supported} OPTIONAL,

 cch-IM-RefRecTypeA-OneRX-Port-v1540 ENUMERATED {supported} OPTIONAL

}

PhyLayerParameters-v1550 ::= SEQUENCE {

 dmrs-OverheadReduction-r15 ENUMERATED {supported} OPTIONAL

}

MIMO-UE-Parameters-r13 ::= SEQUENCE {

 parametersTM9-r13 MIMO-UE-ParametersPerTM-r13 OPTIONAL,

 parametersTM10-r13 MIMO-UE-ParametersPerTM-r13 OPTIONAL,

 srs-EnhancementsTDD-r13 ENUMERATED {supported} OPTIONAL,

 srs-Enhancements-r13 ENUMERATED {supported} OPTIONAL,

 interferenceMeasRestriction-r13 ENUMERATED {supported} OPTIONAL

}

MIMO-UE-Parameters-v13e0 ::= SEQUENCE {

 mimo-WeightedLayersCapabilities-r13 MIMO-WeightedLayersCapabilities-r13 OPTIONAL

}

MIMO-UE-Parameters-v1430 ::= SEQUENCE {

 parametersTM9-v1430 MIMO-UE-ParametersPerTM-v1430 OPTIONAL,

 parametersTM10-v1430 MIMO-UE-ParametersPerTM-v1430 OPTIONAL

}

MIMO-UE-Parameters-v1470 ::= SEQUENCE {

 parametersTM9-v1470 MIMO-UE-ParametersPerTM-v1470,

 parametersTM10-v1470 MIMO-UE-ParametersPerTM-v1470

}

MIMO-UE-ParametersPerTM-r13 ::= SEQUENCE {

 nonPrecoded-r13 MIMO-NonPrecodedCapabilities-r13 OPTIONAL,

 beamformed-r13 MIMO-UE-BeamformedCapabilities-r13 OPTIONAL,

 channelMeasRestriction-r13 ENUMERATED {supported} OPTIONAL,

 dmrs-Enhancements-r13 ENUMERATED {supported} OPTIONAL,

 csi-RS-EnhancementsTDD-r13 ENUMERATED {supported} OPTIONAL

}

MIMO-UE-ParametersPerTM-v1430 ::= SEQUENCE {

 nzp-CSI-RS-AperiodicInfo-r14 SEQUENCE {

 nMaxProc-r14 INTEGER(5..32),

 nMaxResource-r14 ENUMERATED {ffs1, ffs2, ffs3, ffs4}

 } OPTIONAL,

 nzp-CSI-RS-PeriodicInfo-r14 SEQUENCE {

 nMaxResource-r14 ENUMERATED {ffs1, ffs2, ffs3, ffs4}

 } OPTIONAL,

 zp-CSI-RS-AperiodicInfo-r14 ENUMERATED {supported} OPTIONAL,

 ul-dmrs-Enhancements-r14 ENUMERATED {supported} OPTIONAL,

 densityReductionNP-r14 ENUMERATED {supported} OPTIONAL,

 densityReductionBF-r14 ENUMERATED {supported} OPTIONAL,

 hybridCSI-r14 ENUMERATED {supported} OPTIONAL,

 semiOL-r14 ENUMERATED {supported} OPTIONAL,

 csi-ReportingNP-r14 ENUMERATED {supported} OPTIONAL,

 csi-ReportingAdvanced-r14 ENUMERATED {supported} OPTIONAL

}

MIMO-UE-ParametersPerTM-v1470 ::= SEQUENCE {

 csi-ReportingAdvancedMaxPorts-r14 ENUMERATED {n8, n12, n16, n20, n24, n28} OPTIONAL

}

MIMO-CA-ParametersPerBoBC-r13 ::= SEQUENCE {

 parametersTM9-r13 MIMO-CA-ParametersPerBoBCPerTM-r13 OPTIONAL,

 parametersTM10-r13 MIMO-CA-ParametersPerBoBCPerTM-r13 OPTIONAL

}

MIMO-CA-ParametersPerBoBC-r15 ::= SEQUENCE {

 parametersTM9-r15 MIMO-CA-ParametersPerBoBCPerTM-r15 OPTIONAL,

 parametersTM10-r15 MIMO-CA-ParametersPerBoBCPerTM-r15 OPTIONAL

}

MIMO-CA-ParametersPerBoBC-v1430 ::= SEQUENCE {

 parametersTM9-v1430 MIMO-CA-ParametersPerBoBCPerTM-v1430 OPTIONAL,

 parametersTM10-v1430 MIMO-CA-ParametersPerBoBCPerTM-v1430 OPTIONAL

}

MIMO-CA-ParametersPerBoBC-v1470 ::= SEQUENCE {

 parametersTM9-v1470 MIMO-CA-ParametersPerBoBCPerTM-v1470,

 parametersTM10-v1470 MIMO-CA-ParametersPerBoBCPerTM-v1470

}

MIMO-CA-ParametersPerBoBCPerTM-r13 ::= SEQUENCE {

 nonPrecoded-r13 MIMO-NonPrecodedCapabilities-r13 OPTIONAL,

 beamformed-r13 MIMO-BeamformedCapabilityList-r13 OPTIONAL,

 dmrs-Enhancements-r13 ENUMERATED {different} OPTIONAL

}

MIMO-CA-ParametersPerBoBCPerTM-v1430 ::= SEQUENCE {

 csi-ReportingNP-r14 ENUMERATED {different} OPTIONAL,

 csi-ReportingAdvanced-r14 ENUMERATED {different} OPTIONAL

}

MIMO-CA-ParametersPerBoBCPerTM-v1470 ::= SEQUENCE {

 csi-ReportingAdvancedMaxPorts-r14 ENUMERATED {n8, n12, n16, n20, n24, n28} OPTIONAL

}

MIMO-CA-ParametersPerBoBCPerTM-r15 ::= SEQUENCE {

 nonPrecoded-r13 MIMO-NonPrecodedCapabilities-r13 OPTIONAL,

 beamformed-r13 MIMO-BeamformedCapabilityList-r13 OPTIONAL,

 dmrs-Enhancements-r13 ENUMERATED {different} OPTIONAL,

 csi-ReportingNP-r14 ENUMERATED {different} OPTIONAL,

 csi-ReportingAdvanced-r14 ENUMERATED {different} OPTIONAL

}

MIMO-NonPrecodedCapabilities-r13 ::= SEQUENCE {

 config1-r13 ENUMERATED {supported} OPTIONAL,

 config2-r13 ENUMERATED {supported} OPTIONAL,

 config3-r13 ENUMERATED {supported} OPTIONAL,

 config4-r13 ENUMERATED {supported} OPTIONAL

}

MIMO-UE-BeamformedCapabilities-r13 ::= SEQUENCE {

 altCodebook-r13 ENUMERATED {supported} OPTIONAL,

 mimo-BeamformedCapabilities-r13 MIMO-BeamformedCapabilityList-r13

}

MIMO-BeamformedCapabilityList-r13 ::= SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF MIMO-BeamformedCapabilities-r13

MIMO-BeamformedCapabilities-r13 ::= SEQUENCE {

 k-Max-r13 INTEGER (1..8),

 n-MaxList-r13 BIT STRING (SIZE (1..7)) OPTIONAL

}

MIMO-WeightedLayersCapabilities-r13 ::= SEQUENCE {

 relWeightTwoLayers-r13 ENUMERATED {v1, v1dot25, v1dot5, v1dot75, v2, v2dot5, v3, v4},

 relWeightFourLayers-r13 ENUMERATED {v1, v1dot25, v1dot5, v1dot75, v2, v2dot5, v3, v4} OPTIONAL,

 relWeightEightLayers-r13 ENUMERATED {v1, v1dot25, v1dot5, v1dot75, v2, v2dot5, v3, v4} OPTIONAL,

 totalWeightedLayers-r13 INTEGER (2..128)

}

NonContiguousUL-RA-WithinCC-List-r10 ::= SEQUENCE (SIZE (1..maxBands)) OF NonContiguousUL-RA-WithinCC-r10

NonContiguousUL-RA-WithinCC-r10 ::= SEQUENCE {

 nonContiguousUL-RA-WithinCC-Info-r10 ENUMERATED {supported} OPTIONAL

}

RF-Parameters ::= SEQUENCE {

 supportedBandListEUTRA SupportedBandListEUTRA

}

RF-Parameters-v9e0 ::= SEQUENCE {

 supportedBandListEUTRA-v9e0 SupportedBandListEUTRA-v9e0 OPTIONAL

}

RF-Parameters-v1020 ::= SEQUENCE {

 supportedBandCombination-r10 SupportedBandCombination-r10

}

RF-Parameters-v1060 ::= SEQUENCE {

 supportedBandCombinationExt-r10 SupportedBandCombinationExt-r10

}

RF-Parameters-v1090 ::= SEQUENCE {

 supportedBandCombination-v1090 SupportedBandCombination-v1090 OPTIONAL

}

RF-Parameters-v10f0 ::= SEQUENCE {

 modifiedMPR-Behavior-r10 BIT STRING (SIZE (32)) OPTIONAL

}

RF-Parameters-v10i0 ::= SEQUENCE {

 supportedBandCombination-v10i0 SupportedBandCombination-v10i0 OPTIONAL

}

RF-Parameters-v10j0 ::= SEQUENCE {

 multiNS-Pmax-r10 ENUMERATED {supported} OPTIONAL

}

RF-Parameters-v1130 ::= SEQUENCE {

 supportedBandCombination-v1130 SupportedBandCombination-v1130 OPTIONAL

}

RF-Parameters-v1180 ::= SEQUENCE {

 freqBandRetrieval-r11 ENUMERATED {supported} OPTIONAL,

 requestedBands-r11 SEQUENCE (SIZE (1.. maxBands)) OF FreqBandIndicator-r11 OPTIONAL,

 supportedBandCombinationAdd-r11 SupportedBandCombinationAdd-r11 OPTIONAL

}

RF-Parameters-v11d0 ::= SEQUENCE {

 supportedBandCombinationAdd-v11d0 SupportedBandCombinationAdd-v11d0 OPTIONAL

}

RF-Parameters-v1250 ::= SEQUENCE {

 supportedBandListEUTRA-v1250 SupportedBandListEUTRA-v1250 OPTIONAL,

 supportedBandCombination-v1250 SupportedBandCombination-v1250 OPTIONAL,

 supportedBandCombinationAdd-v1250 SupportedBandCombinationAdd-v1250 OPTIONAL,

 freqBandPriorityAdjustment-r12 ENUMERATED {supported} OPTIONAL

}

RF-Parameters-v1270 ::= SEQUENCE {

 supportedBandCombination-v1270 SupportedBandCombination-v1270 OPTIONAL,

 supportedBandCombinationAdd-v1270 SupportedBandCombinationAdd-v1270 OPTIONAL

}

RF-Parameters-v1310 ::= SEQUENCE {

 eNB-RequestedParameters-r13 SEQUENCE {

 reducedIntNonContCombRequested-r13 ENUMERATED {true} OPTIONAL,

 requestedCCsDL-r13 INTEGER (2..32) OPTIONAL,

 requestedCCsUL-r13 INTEGER (2..32) OPTIONAL,

 skipFallbackCombRequested-r13 ENUMERATED {true} OPTIONAL

 } OPTIONAL,

 maximumCCsRetrieval-r13 ENUMERATED {supported} OPTIONAL,

 skipFallbackCombinations-r13 ENUMERATED {supported} OPTIONAL,

 reducedIntNonContComb-r13 ENUMERATED {supported} OPTIONAL,

 supportedBandListEUTRA-v1310 SupportedBandListEUTRA-v1310 OPTIONAL,

 supportedBandCombinationReduced-r13 SupportedBandCombinationReduced-r13 OPTIONAL

}

RF-Parameters-v1320 ::= SEQUENCE {

 supportedBandListEUTRA-v1320 SupportedBandListEUTRA-v1320 OPTIONAL,

 supportedBandCombination-v1320 SupportedBandCombination-v1320 OPTIONAL,

 supportedBandCombinationAdd-v1320 SupportedBandCombinationAdd-v1320 OPTIONAL,

 supportedBandCombinationReduced-v1320 SupportedBandCombinationReduced-v1320 OPTIONAL

}

RF-Parameters-v1380 ::= SEQUENCE {

 supportedBandCombination-v1380 SupportedBandCombination-v1380 OPTIONAL,

 supportedBandCombinationAdd-v1380 SupportedBandCombinationAdd-v1380 OPTIONAL,

 supportedBandCombinationReduced-v1380 SupportedBandCombinationReduced-v1380 OPTIONAL

}

RF-Parameters-v1390 ::= SEQUENCE {

 supportedBandCombination-v1390 SupportedBandCombination-v1390 OPTIONAL,

 supportedBandCombinationAdd-v1390 SupportedBandCombinationAdd-v1390 OPTIONAL,

 supportedBandCombinationReduced-v1390 SupportedBandCombinationReduced-v1390 OPTIONAL

}

RF-Parameters-v12b0 ::= SEQUENCE {

 maxLayersMIMO-Indication-r12 ENUMERATED {supported} OPTIONAL

}

RF-Parameters-v1430 ::= SEQUENCE {

 supportedBandCombination-v1430 SupportedBandCombination-v1430 OPTIONAL,

 supportedBandCombinationAdd-v1430 SupportedBandCombinationAdd-v1430 OPTIONAL,

 supportedBandCombinationReduced-v1430 SupportedBandCombinationReduced-v1430 OPTIONAL,

 eNB-RequestedParameters-v1430 SEQUENCE {

 requestedDiffFallbackCombList-r14 BandCombinationList-r14

 } OPTIONAL,

 diffFallbackCombReport-r14 ENUMERATED {supported} OPTIONAL

}

RF-Parameters-v1450 ::= SEQUENCE {

 supportedBandCombination-v1450 SupportedBandCombination-v1450 OPTIONAL,

 supportedBandCombinationAdd-v1450 SupportedBandCombinationAdd-v1450 OPTIONAL,

 supportedBandCombinationReduced-v1450 SupportedBandCombinationReduced-v1450 OPTIONAL

}

RF-Parameters-v1470 ::= SEQUENCE {

 supportedBandCombination-v1470 SupportedBandCombination-v1470 OPTIONAL,

 supportedBandCombinationAdd-v1470 SupportedBandCombinationAdd-v1470 OPTIONAL,

 supportedBandCombinationReduced-v1470 SupportedBandCombinationReduced-v1470 OPTIONAL

}

RF-Parameters-v14b0 ::= SEQUENCE {

 supportedBandCombination-v14b0 SupportedBandCombination-v14b0 OPTIONAL,

 supportedBandCombinationAdd-v14b0 SupportedBandCombinationAdd-v14b0 OPTIONAL,

 supportedBandCombinationReduced-v14b0 SupportedBandCombinationReduced-v14b0 OPTIONAL

}

RF-Parameters-v1530 ::= SEQUENCE {

 sTTI-SPT-Supported-r15 ENUMERATED {supported} OPTIONAL,

 supportedBandCombination-v1530 SupportedBandCombination-v1530 OPTIONAL,

 supportedBandCombinationAdd-v1530 SupportedBandCombinationAdd-v1530 OPTIONAL,

 supportedBandCombinationReduced-v1530 SupportedBandCombinationReduced-v1530 OPTIONAL,

 powerClass-14dBm-r15 ENUMERATED {supported} OPTIONAL

}

RF-Parameters-v1570 ::= SEQUENCE {

 dl-1024QAM-ScalingFactor-r15 ENUMERATED {v1, v1dot2, v1dot25},

 dl-1024QAM-TotalWeightedLayers-r15 INTEGER (0..10)

}

RF-Parameters-v16x0 ::= SEQUENCE {

 supportedBandCombination-v16x0 SupportedBandCombination-v16x0 OPTIONAL,

 supportedBandCombinationAdd-v16x0 SupportedBandCombinationAdd-v16x0 OPTIONAL

}

SkipSubframeProcessing-r15 ::= SEQUENCE {

 skipProcessingDL-Slot-r15 INTEGER (0..3) OPTIONAL,

 skipProcessingDL-SubSlot-r15 INTEGER (0..3) OPTIONAL,

 skipProcessingUL-Slot-r15 INTEGER (0..3) OPTIONAL,

 skipProcessingUL-SubSlot-r15 INTEGER (0..3) OPTIONAL

}

SPT-Parameters-r15 ::= SEQUENCE {

 frameStructureType-SPT-r15 BIT STRING (SIZE (3)) OPTIONAL,

 maxNumberCCs-SPT-r15 INTEGER (1..32) OPTIONAL

}

STTI-SPT-BandParameters-r15 ::= SEQUENCE {

 dl-1024QAM-Slot-r15 ENUMERATED {supported} OPTIONAL,

 dl-1024QAM-SubslotTA-1-r15 ENUMERATED {supported} OPTIONAL,

 dl-1024QAM-SubslotTA-2-r15 ENUMERATED {supported} OPTIONAL,

 simultaneousTx-differentTx-duration-r15 ENUMERATED {supported} OPTIONAL,

 sTTI-CA-MIMO-ParametersDL-r15 CA-MIMO-ParametersDL-r15 OPTIONAL,

 sTTI-CA-MIMO-ParametersUL-r15 CA-MIMO-ParametersUL-r15,

 sTTI-FD-MIMO-Coexistence ENUMERATED {supported} OPTIONAL,

 sTTI-MIMO-CA-ParametersPerBoBCs-r15 MIMO-CA-ParametersPerBoBC-r13 OPTIONAL,

 sTTI-MIMO-CA-ParametersPerBoBCs-v1530 MIMO-CA-ParametersPerBoBC-v1430 OPTIONAL,

 sTTI-SupportedCombinations-r15 STTI-SupportedCombinations-r15 OPTIONAL,

 sTTI-SupportedCSI-Proc-r15 ENUMERATED {n1, n3, n4} OPTIONAL,

 ul-256QAM-Slot-r15 ENUMERATED {supported} OPTIONAL,

 ul-256QAM-Subslot-r15 ENUMERATED {supported} OPTIONAL,

 ...

}

STTI-SupportedCombinations-r15 ::= SEQUENCE {

 combination-22-r15 DL-UL-CCs-r15 OPTIONAL,

 combination-77-r15 DL-UL-CCs-r15 OPTIONAL,

 combination-27-r15 DL-UL-CCs-r15 OPTIONAL,

 combination-22-27-r15 SEQUENCE (SIZE (1..2)) OF DL-UL-CCs-r15 OPTIONAL,

 combination-77-22-r15 SEQUENCE (SIZE (1..2)) OF DL-UL-CCs-r15 OPTIONAL,

 combination-77-27-r15 SEQUENCE (SIZE (1..2)) OF DL-UL-CCs-r15 OPTIONAL

}

DL-UL-CCs-r15 ::= SEQUENCE {

 maxNumberDL-CCs-r15 INTEGER (1..32) OPTIONAL,

 maxNumberUL-CCs-r15 INTEGER (1..32) OPTIONAL

}

SupportedBandCombination-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-r10

SupportedBandCombinationExt-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParametersExt-r10

SupportedBandCombination-v1090 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1090

SupportedBandCombination-v10i0 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v10i0

SupportedBandCombination-v1130 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1130

SupportedBandCombination-v1250 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1250

SupportedBandCombination-v1270 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1270

SupportedBandCombination-v1320 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1320

SupportedBandCombination-v1380 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1380

SupportedBandCombination-v1390 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1390

SupportedBandCombination-v1430 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1430

SupportedBandCombination-v1450 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1450

SupportedBandCombination-v1470 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1470

SupportedBandCombination-v14b0 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v14b0

SupportedBandCombination-v1530 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1530

SupportedBandCombination-v16x0 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v16x0

SupportedBandCombinationAdd-r11 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-r11

SupportedBandCombinationAdd-v11d0 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v10i0

SupportedBandCombinationAdd-v1250 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1250

SupportedBandCombinationAdd-v1270 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1270

SupportedBandCombinationAdd-v1320 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1320

SupportedBandCombinationAdd-v1380 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1380

SupportedBandCombinationAdd-v1390 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1390

SupportedBandCombinationAdd-v1430 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1430

SupportedBandCombinationAdd-v1450 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1450

SupportedBandCombinationAdd-v1470 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1470

SupportedBandCombinationAdd-v14b0 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v14b0

SupportedBandCombinationAdd-v1530 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1530

SupportedBandCombinationAdd-v16x0 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v16x0

SupportedBandCombinationReduced-r13 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-r13

SupportedBandCombinationReduced-v1320 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v1320

SupportedBandCombinationReduced-v1380 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v1380

SupportedBandCombinationReduced-v1390 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v1390

SupportedBandCombinationReduced-v1430 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v1430

SupportedBandCombinationReduced-v1450 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v1450

SupportedBandCombinationReduced-v1470 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v1470

SupportedBandCombinationReduced-v14b0 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v14b0

SupportedBandCombinationReduced-v1530 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v1530

BandCombinationParameters-r10 ::= SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-r10

BandCombinationParametersExt-r10 ::= SEQUENCE {

 supportedBandwidthCombinationSet-r10 SupportedBandwidthCombinationSet-r10 OPTIONAL

}

BandCombinationParameters-v1090 ::= SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v1090

BandCombinationParameters-v10i0::= SEQUENCE {

 bandParameterList-v10i0 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF

 BandParameters-v10i0 OPTIONAL

}

BandCombinationParameters-v1130 ::= SEQUENCE {

 multipleTimingAdvance-r11 ENUMERATED {supported} OPTIONAL,

 simultaneousRx-Tx-r11 ENUMERATED {supported} OPTIONAL,

 bandParameterList-r11 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v1130 OPTIONAL,

 ...

}

BandCombinationParameters-r11 ::= SEQUENCE {

 bandParameterList-r11 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF

 BandParameters-r11,

 supportedBandwidthCombinationSet-r11 SupportedBandwidthCombinationSet-r10 OPTIONAL,

 multipleTimingAdvance-r11 ENUMERATED {supported} OPTIONAL,

 simultaneousRx-Tx-r11 ENUMERATED {supported} OPTIONAL,

 bandInfoEUTRA-r11 BandInfoEUTRA,

 ...

}

BandCombinationParameters-v1250::= SEQUENCE {

 dc-Support-r12 SEQUENCE {

 asynchronous-r12 ENUMERATED {supported} OPTIONAL,

 supportedCellGrouping-r12 CHOICE {

 threeEntries-r12 BIT STRING (SIZE(3)),

 fourEntries-r12 BIT STRING (SIZE(7)),

 fiveEntries-r12 BIT STRING (SIZE(15))

 } OPTIONAL

 } OPTIONAL,

 supportedNAICS-2CRS-AP-r12 BIT STRING (SIZE (1..maxNAICS-Entries-r12)) OPTIONAL,

 commSupportedBandsPerBC-r12 BIT STRING (SIZE (1.. maxBands)) OPTIONAL,

 ...

}

BandCombinationParameters-v1270 ::= SEQUENCE {

 bandParameterList-v1270 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF

 BandParameters-v1270 OPTIONAL

}

BandCombinationParameters-r13 ::= SEQUENCE {

 differentFallbackSupported-r13 ENUMERATED {true} OPTIONAL,

 bandParameterList-r13 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-r13,

 supportedBandwidthCombinationSet-r13 SupportedBandwidthCombinationSet-r10 OPTIONAL,

 multipleTimingAdvance-r13 ENUMERATED {supported} OPTIONAL,

 simultaneousRx-Tx-r13 ENUMERATED {supported} OPTIONAL,

 bandInfoEUTRA-r13 BandInfoEUTRA,

 dc-Support-r13 SEQUENCE {

 asynchronous-r13 ENUMERATED {supported} OPTIONAL,

 supportedCellGrouping-r13 CHOICE {

 threeEntries-r13 BIT STRING (SIZE(3)),

 fourEntries-r13 BIT STRING (SIZE(7)),

 fiveEntries-r13 BIT STRING (SIZE(15))

 } OPTIONAL

 } OPTIONAL,

 supportedNAICS-2CRS-AP-r13 BIT STRING (SIZE (1..maxNAICS-Entries-r12)) OPTIONAL,

 commSupportedBandsPerBC-r13 BIT STRING (SIZE (1.. maxBands)) OPTIONAL

}

BandCombinationParameters-v1320 ::= SEQUENCE {

 bandParameterList-v1320 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF

 BandParameters-v1320 OPTIONAL,

 additionalRx-Tx-PerformanceReq-r13 ENUMERATED {supported} OPTIONAL

}

BandCombinationParameters-v1380 ::= SEQUENCE {

 bandParameterList-v1380 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF

 BandParameters-v1380 OPTIONAL

}

BandCombinationParameters-v1390 ::= SEQUENCE {

 ue-CA-PowerClass-N-r13 ENUMERATED {class2} OPTIONAL

}

BandCombinationParameters-v1430 ::= SEQUENCE {

 bandParameterList-v1430 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF

 BandParameters-v1430 OPTIONAL,

 v2x-SupportedTxBandCombListPerBC-r14 BIT STRING (SIZE (1.. maxBandComb-r13)) OPTIONAL,

 v2x-SupportedRxBandCombListPerBC-r14 BIT STRING (SIZE (1.. maxBandComb-r13)) OPTIONAL

}

BandCombinationParameters-v1450 ::= SEQUENCE {

 bandParameterList-v1450 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF

 BandParameters-v1450 OPTIONAL

}

BandCombinationParameters-v1470 ::= SEQUENCE {

 bandParameterList-v1470 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF

 BandParameters-v1470 OPTIONAL,

 srs-MaxSimultaneousCCs-r14 INTEGER (1..31) OPTIONAL

}

BandCombinationParameters-v14b0 ::= SEQUENCE {

 bandParameterList-v14b0 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF

 BandParameters-v14b0 OPTIONAL

}

BandCombinationParameters-v1530 ::= SEQUENCE {

 bandParameterList-v1530 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v1530 OPTIONAL,

 spt-Parameters-r15 SPT-Parameters-r15 OPTIONAL

}

-- If an additional band combination parameter is defined, which is supported for MR-DC,

-- it shall be defined in the IE CA-ParametersEUTRA in TS 38.331 [82].

BandCombinationParameters-v16x0 ::= SEQUENCE {

 bandParameterList-v16x0 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v16x0 OPTIONAL,

 daps-Parameters-r16 SEQUENCE {

 asyncDAPS-r16 ENUMERATED {supported} OPTIONAL,

 inter-FreqDAPS-r16 ENUMERATED {supported} OPTIONAL,

 pdcch-BlindDetectionSource-r16 INTEGER (2..16) OPTIONAL, -- FFS to be confirmed in RAN1

 pdcch-BlindDetectionTarget-r16 INTEGER (2..16) OPTIONAL, -- FFS to be confirmed in RAN1

 singleUL-TransmissionDAPS-r16 ENUMERATED {supported} OPTIONAL,

 supportedNumberTAG-DAPS-r16 ENUMERATED {n2, n3, n4} OPTIONAL, -- FFS do we need repeat it?

 uplinkPowerSharingDAPS-r16 ENUMERATED {dynamic, semiStaticM1, semiStaticM2, all} OPTIONAL -- FFS to be confirmed in RAN1

 }

}

SupportedBandwidthCombinationSet-r10 ::= BIT STRING (SIZE (1..maxBandwidthCombSet-r10))

BandParameters-r10 ::= SEQUENCE {

 bandEUTRA-r10 FreqBandIndicator,

 bandParametersUL-r10 BandParametersUL-r10 OPTIONAL,

 bandParametersDL-r10 BandParametersDL-r10 OPTIONAL

}

BandParameters-v1090 ::= SEQUENCE {

 bandEUTRA-v1090 FreqBandIndicator-v9e0 OPTIONAL,

 ...

}

BandParameters-v10i0::= SEQUENCE {

 bandParametersDL-v10i0 SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-v10i0

}

BandParameters-v1130 ::= SEQUENCE {

 supportedCSI-Proc-r11 ENUMERATED {n1, n3, n4}

}

BandParameters-r11 ::= SEQUENCE {

 bandEUTRA-r11 FreqBandIndicator-r11,

 bandParametersUL-r11 BandParametersUL-r10 OPTIONAL,

 bandParametersDL-r11 BandParametersDL-r10 OPTIONAL,

 supportedCSI-Proc-r11 ENUMERATED {n1, n3, n4} OPTIONAL

}

BandParameters-v1270 ::= SEQUENCE {

 bandParametersDL-v1270 SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-v1270

}

BandParameters-r13 ::= SEQUENCE {

 bandEUTRA-r13 FreqBandIndicator-r11,

 bandParametersUL-r13 BandParametersUL-r13 OPTIONAL,

 bandParametersDL-r13 BandParametersDL-r13 OPTIONAL,

 supportedCSI-Proc-r13 ENUMERATED {n1, n3, n4} OPTIONAL

}

BandParameters-v1320 ::= SEQUENCE {

 bandParametersDL-v1320 MIMO-CA-ParametersPerBoBC-r13

}

BandParameters-v1380 ::= SEQUENCE {

 txAntennaSwitchDL-r13 INTEGER (1..32) OPTIONAL,

 txAntennaSwitchUL-r13 INTEGER (1..32) OPTIONAL

}

BandParameters-v1430 ::= SEQUENCE {

 bandParametersDL-v1430 MIMO-CA-ParametersPerBoBC-v1430 OPTIONAL,

 ul-256QAM-r14 ENUMERATED {supported} OPTIONAL,

 ul-256QAM-perCC-InfoList-r14 SEQUENCE (SIZE (2..maxServCell-r13)) OF UL-256QAM-perCC-Info-r14 OPTIONAL,

 srs-CapabilityPerBandPairList-r14 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF

 SRS-CapabilityPerBandPair-r14 OPTIONAL

}

BandParameters-v1450 ::= SEQUENCE {

 must-CapabilityPerBand-r14 MUST-Parameters-r14 OPTIONAL

}

BandParameters-v1470 ::= SEQUENCE {

 bandParametersDL-v1470 MIMO-CA-ParametersPerBoBC-v1470 OPTIONAL

}

BandParameters-v14b0 ::= SEQUENCE {

 srs-CapabilityPerBandPairList-v14b0 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF SRS-CapabilityPerBandPair-v14b0 OPTIONAL

}

BandParameters-v1530 ::= SEQUENCE {

 ue-TxAntennaSelection-SRS-1T4R-r15 ENUMERATED {supported} OPTIONAL,

 ue-TxAntennaSelection-SRS-2T4R-2Pairs-r15 ENUMERATED {supported} OPTIONAL,

 ue-TxAntennaSelection-SRS-2T4R-3Pairs-r15 ENUMERATED {supported} OPTIONAL,

 dl-1024QAM-r15 ENUMERATED {supported} OPTIONAL,

 qcl-TypeC-Operation-r15 ENUMERATED {supported} OPTIONAL,

 qcl-CRI-BasedCSI-Reporting-r15 ENUMERATED {supported} OPTIONAL,

 stti-SPT-BandParameters-r15 STTI-SPT-BandParameters-r15 OPTIONAL

}

BandParameters-v16x0 ::= SEQUENCE {

 intraFreq-DAPS-r16 ENUMERATED {supported} OPTIONAL

}

V2X-BandParameters-r14 ::= SEQUENCE {

 v2x-FreqBandEUTRA-r14 FreqBandIndicator-r11,

 bandParametersTxSL-r14 BandParametersTxSL-r14 OPTIONAL,

 bandParametersRxSL-r14 BandParametersRxSL-r14 OPTIONAL

}

V2X-BandParameters-v1530 ::= SEQUENCE {

 v2x-EnhancedHighReception-r15 ENUMERATED {supported} OPTIONAL

}

BandParametersTxSL-r14 ::= SEQUENCE {

 v2x-BandwidthClassTxSL-r14 V2X-BandwidthClassSL-r14,

 v2x-eNB-Scheduled-r14 ENUMERATED {supported} OPTIONAL,

 v2x-HighPower-r14 ENUMERATED {supported} OPTIONAL

}

BandParametersRxSL-r14 ::= SEQUENCE {

 v2x-BandwidthClassRxSL-r14 V2X-BandwidthClassSL-r14,

 v2x-HighReception-r14 ENUMERATED {supported} OPTIONAL

}

V2X-BandwidthClassSL-r14 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF V2X-BandwidthClass-r14

UL-256QAM-perCC-Info-r14 ::= SEQUENCE {

 ul-256QAM-perCC-r14 ENUMERATED {supported} OPTIONAL

}

FeatureSetDL-r15 ::= SEQUENCE {

 mimo-CA-ParametersPerBoBC-r15 MIMO-CA-ParametersPerBoBC-r15 OPTIONAL,

 featureSetPerCC-ListDL-r15 SEQUENCE (SIZE (1..maxServCell-r13)) OF FeatureSetDL-PerCC-Id-r15

}

FeatureSetDL-v1550 ::= SEQUENCE {

 dl-1024QAM-r15 ENUMERATED {supported} OPTIONAL

}

FeatureSetDL-PerCC-r15 ::= SEQUENCE {

 fourLayerTM3-TM4-r15 ENUMERATED {supported} OPTIONAL,

 supportedMIMO-CapabilityDL-MRDC-r15 MIMO-CapabilityDL-r10 OPTIONAL,

 supportedCSI-Proc-r15 ENUMERATED {n1, n3, n4} OPTIONAL

}

FeatureSetUL-r15 ::= SEQUENCE {

 featureSetPerCC-ListUL-r15 SEQUENCE (SIZE(1..maxServCell-r13)) OF FeatureSetUL-PerCC-Id-r15

}

FeatureSetUL-PerCC-r15 ::= SEQUENCE {

 supportedMIMO-CapabilityUL-r15 MIMO-CapabilityUL-r10 OPTIONAL,

 ul-256QAM-r15 ENUMERATED {supported} OPTIONAL

}

FeatureSetDL-PerCC-Id-r15 ::= INTEGER (0..maxPerCC-FeatureSets-r15)

FeatureSetUL-PerCC-Id-r15 ::= INTEGER (0..maxPerCC-FeatureSets-r15)

BandParametersUL-r10 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersUL-r10

BandParametersUL-r13 ::= CA-MIMO-ParametersUL-r10

CA-MIMO-ParametersUL-r10 ::= SEQUENCE {

 ca-BandwidthClassUL-r10 CA-BandwidthClass-r10,

 supportedMIMO-CapabilityUL-r10 MIMO-CapabilityUL-r10 OPTIONAL

}

CA-MIMO-ParametersUL-r15 ::= SEQUENCE {

 supportedMIMO-CapabilityUL-r15 MIMO-CapabilityUL-r10 OPTIONAL

}

BandParametersDL-r10 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-r10

BandParametersDL-r13 ::= CA-MIMO-ParametersDL-r13

CA-MIMO-ParametersDL-r10 ::= SEQUENCE {

 ca-BandwidthClassDL-r10 CA-BandwidthClass-r10,

 supportedMIMO-CapabilityDL-r10 MIMO-CapabilityDL-r10 OPTIONAL

}

CA-MIMO-ParametersDL-v10i0 ::= SEQUENCE {

 fourLayerTM3-TM4-r10 ENUMERATED {supported} OPTIONAL

}

CA-MIMO-ParametersDL-v1270 ::= SEQUENCE {

 intraBandContiguousCC-InfoList-r12 SEQUENCE (SIZE (1..maxServCell-r10)) OF IntraBandContiguousCC-Info-r12

}

CA-MIMO-ParametersDL-r13 ::= SEQUENCE {

 ca-BandwidthClassDL-r13 CA-BandwidthClass-r10,

 supportedMIMO-CapabilityDL-r13 MIMO-CapabilityDL-r10 OPTIONAL,

 fourLayerTM3-TM4-r13 ENUMERATED {supported} OPTIONAL,

 intraBandContiguousCC-InfoList-r13 SEQUENCE (SIZE (1..maxServCell-r13)) OF IntraBandContiguousCC-Info-r12

}

CA-MIMO-ParametersDL-r15 ::= SEQUENCE {

 supportedMIMO-CapabilityDL-r15 MIMO-CapabilityDL-r10 OPTIONAL,

 fourLayerTM3-TM4-r15 ENUMERATED {supported} OPTIONAL,

 intraBandContiguousCC-InfoList-r15 SEQUENCE (SIZE (1..maxServCell-r13)) OF

 IntraBandContiguousCC-Info-r12 OPTIONAL

}

IntraBandContiguousCC-Info-r12 ::= SEQUENCE {

 fourLayerTM3-TM4-perCC-r12 ENUMERATED {supported} OPTIONAL,

 supportedMIMO-CapabilityDL-r12 MIMO-CapabilityDL-r10 OPTIONAL,

 supportedCSI-Proc-r12 ENUMERATED {n1, n3, n4} OPTIONAL

}

CA-BandwidthClass-r10 ::= ENUMERATED {a, b, c, d, e, f, ...}

V2X-BandwidthClass-r14 ::= ENUMERATED {a, b, c, d, e, f, ..., c1-v1530}

MIMO-CapabilityUL-r10 ::= ENUMERATED {twoLayers, fourLayers}

MIMO-CapabilityDL-r10 ::= ENUMERATED {twoLayers, fourLayers, eightLayers}

MUST-Parameters-r14 ::= SEQUENCE {

 must-TM234-UpTo2Tx-r14 ENUMERATED {supported} OPTIONAL,

 must-TM89-UpToOneInterferingLayer-r14 ENUMERATED {supported} OPTIONAL,

 must-TM10-UpToOneInterferingLayer-r14 ENUMERATED {supported} OPTIONAL,

 must-TM89-UpToThreeInterferingLayers-r14 ENUMERATED {supported} OPTIONAL,

 must-TM10-UpToThreeInterferingLayers-r14 ENUMERATED {supported} OPTIONAL

}

SupportedBandListEUTRA ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA

SupportedBandListEUTRA-v9e0::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v9e0

SupportedBandListEUTRA-v1250 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1250

SupportedBandListEUTRA-v1310 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1310

SupportedBandListEUTRA-v1320 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1320

SupportedBandEUTRA ::= SEQUENCE {

 bandEUTRA FreqBandIndicator,

 halfDuplex BOOLEAN

}

SupportedBandEUTRA-v9e0 ::= SEQUENCE {

 bandEUTRA-v9e0 FreqBandIndicator-v9e0 OPTIONAL

}

SupportedBandEUTRA-v1250 ::= SEQUENCE {

 dl-256QAM-r12 ENUMERATED {supported} OPTIONAL,

 ul-64QAM-r12 ENUMERATED {supported} OPTIONAL

}

SupportedBandEUTRA-v1310 ::= SEQUENCE {

 ue-PowerClass-5-r13 ENUMERATED {supported} OPTIONAL

}

SupportedBandEUTRA-v1320 ::= SEQUENCE {

 intraFreq-CE-NeedForGaps-r13 ENUMERATED {supported} OPTIONAL,

 ue-PowerClass-N-r13 ENUMERATED {class1, class2, class4} OPTIONAL

}

MeasParameters ::= SEQUENCE {

 bandListEUTRA BandListEUTRA

}

MeasParameters-v1020 ::= SEQUENCE {

 bandCombinationListEUTRA-r10 BandCombinationListEUTRA-r10

}

MeasParameters-v1130 ::= SEQUENCE {

 rsrqMeasWideband-r11 ENUMERATED {supported} OPTIONAL

}

MeasParameters-v11a0 ::= SEQUENCE {

 benefitsFromInterruption-r11 ENUMERATED {true} OPTIONAL

}

MeasParameters-v1250 ::= SEQUENCE {

 timerT312-r12 ENUMERATED {supported} OPTIONAL,

 alternativeTimeToTrigger-r12 ENUMERATED {supported} OPTIONAL,

 incMonEUTRA-r12 ENUMERATED {supported} OPTIONAL,

 incMonUTRA-r12 ENUMERATED {supported} OPTIONAL,

 extendedMaxMeasId-r12 ENUMERATED {supported} OPTIONAL,

 extendedRSRQ-LowerRange-r12 ENUMERATED {supported} OPTIONAL,

 rsrq-OnAllSymbols-r12 ENUMERATED {supported} OPTIONAL,

 crs-DiscoverySignalsMeas-r12 ENUMERATED {supported} OPTIONAL,

 csi-RS-DiscoverySignalsMeas-r12 ENUMERATED {supported} OPTIONAL

}

MeasParameters-v1310 ::= SEQUENCE {

 rs-SINR-Meas-r13 ENUMERATED {supported} OPTIONAL,

 whiteCellList-r13 ENUMERATED {supported} OPTIONAL,

 extendedMaxObjectId-r13 ENUMERATED {supported} OPTIONAL,

 ul-PDCP-Delay-r13 ENUMERATED {supported} OPTIONAL,

 extendedFreqPriorities-r13 ENUMERATED {supported} OPTIONAL,

 multiBandInfoReport-r13 ENUMERATED {supported} OPTIONAL,

 rssi-AndChannelOccupancyReporting-r13 ENUMERATED {supported} OPTIONAL

}

MeasParameters-v1430 ::= SEQUENCE {

 ceMeasurements-r14 ENUMERATED {supported} OPTIONAL,

 ncsg-r14 ENUMERATED {supported} OPTIONAL,

 shortMeasurementGap-r14 ENUMERATED {supported} OPTIONAL,

 perServingCellMeasurementGap-r14 ENUMERATED {supported} OPTIONAL,

 nonUniformGap-r14 ENUMERATED {supported} OPTIONAL

}

MeasParameters-v1520 ::= SEQUENCE {

 measGapPatterns-r15 BIT STRING (SIZE (8)) OPTIONAL

}

MeasParameters-v1530 ::= SEQUENCE {

 qoe-MeasReport-r15 ENUMERATED {supported} OPTIONAL,

 qoe-MTSI-MeasReport-r15 ENUMERATED {supported} OPTIONAL,

 ca-IdleModeMeasurements-r15 ENUMERATED {supported} OPTIONAL,

 ca-IdleModeValidityArea-r15 ENUMERATED {supported} OPTIONAL,

 heightMeas-r15 ENUMERATED {supported} OPTIONAL,

 multipleCellsMeasExtension-r15 ENUMERATED {supported} OPTIONAL

}

BandListEUTRA ::= SEQUENCE (SIZE (1..maxBands)) OF BandInfoEUTRA

BandCombinationListEUTRA-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandInfoEUTRA

BandInfoEUTRA ::= SEQUENCE {

 interFreqBandList InterFreqBandList,

 interRAT-BandList InterRAT-BandList OPTIONAL

}

InterFreqBandList ::= SEQUENCE (SIZE (1..maxBands)) OF InterFreqBandInfo

InterFreqBandInfo ::= SEQUENCE {

 interFreqNeedForGaps BOOLEAN

}

InterRAT-BandList ::= SEQUENCE (SIZE (1..maxBands)) OF InterRAT-BandInfo

InterRAT-BandInfo ::= SEQUENCE {

 interRAT-NeedForGaps BOOLEAN

}

IRAT-ParametersNR-r15 ::= SEQUENCE {

 en-DC-r15 ENUMERATED {supported} OPTIONAL,

 eventB2-r15 ENUMERATED {supported} OPTIONAL,

 supportedBandListEN-DC-r15 SupportedBandListNR-r15 OPTIONAL

}

IRAT-ParametersNR-v1540 ::= SEQUENCE {

 eutra-5GC-HO-ToNR-FDD-FR1-r15 ENUMERATED {supported} OPTIONAL,

 eutra-5GC-HO-ToNR-TDD-FR1-r15 ENUMERATED {supported} OPTIONAL,

 eutra-5GC-HO-ToNR-FDD-FR2-r15 ENUMERATED {supported} OPTIONAL,

 eutra-5GC-HO-ToNR-TDD-FR2-r15 ENUMERATED {supported} OPTIONAL,

 eutra-EPC-HO-ToNR-FDD-FR1-r15 ENUMERATED {supported} OPTIONAL,

 eutra-EPC-HO-ToNR-TDD-FR1-r15 ENUMERATED {supported} OPTIONAL,

 eutra-EPC-HO-ToNR-FDD-FR2-r15 ENUMERATED {supported} OPTIONAL,

 eutra-EPC-HO-ToNR-TDD-FR2-r15 ENUMERATED {supported} OPTIONAL,

 ims-VoiceOverNR-FR1-r15 ENUMERATED {supported} OPTIONAL,

 ims-VoiceOverNR-FR2-r15 ENUMERATED {supported} OPTIONAL,

 sa-NR-r15 ENUMERATED {supported} OPTIONAL,

 supportedBandListNR-SA-r15 SupportedBandListNR-r15 OPTIONAL

}

IRAT-ParametersNR-v1560 ::= SEQUENCE {

 ng-EN-DC-r15 ENUMERATED {supported} OPTIONAL

}

IRAT-ParametersNR-v1570 ::= SEQUENCE {

 ss-SINR-Meas-NR-FR1-r15 ENUMERATED {supported} OPTIONAL,

 ss-SINR-Meas-NR-FR2-r15 ENUMERATED {supported} OPTIONAL

}

EUTRA-5GC-Parameters-r15 ::= SEQUENCE {

 eutra-5GC-r15 ENUMERATED {supported} OPTIONAL,

 eutra-EPC-HO-EUTRA-5GC-r15 ENUMERATED {supported} OPTIONAL,

 ho-EUTRA-5GC-FDD-TDD-r15 ENUMERATED {supported} OPTIONAL,

 ho-InterfreqEUTRA-5GC-r15 ENUMERATED {supported} OPTIONAL,

 ims-VoiceOverMCG-BearerEUTRA-5GC-r15 ENUMERATED {supported} OPTIONAL,

 inactiveState-r15 ENUMERATED {supported} OPTIONAL,

 reflectiveQoS-r15 ENUMERATED {supported} OPTIONAL

}

PDCP-ParametersNR-r15 ::= SEQUENCE {

 rohc-Profiles-r15 ROHC-ProfileSupportList-r15,

 rohc-ContextMaxSessions-r15 ENUMERATED {

 cs2, cs4, cs8, cs12, cs16, cs24, cs32,

 cs48, cs64, cs128, cs256, cs512, cs1024,

 cs16384, spare2, spare1} DEFAULT cs16,

 rohc-ProfilesUL-Only-r15 SEQUENCE {

 profile0x0006-r15 BOOLEAN

 },

 rohc-ContextContinue-r15 ENUMERATED {supported} OPTIONAL,

 outOfOrderDelivery-r15 ENUMERATED {supported} OPTIONAL,

 sn-SizeLo-r15 ENUMERATED {supported} OPTIONAL,

 ims-VoiceOverNR-PDCP-MCG-Bearer-r15 ENUMERATED {supported} OPTIONAL,

 ims-VoiceOverNR-PDCP-SCG-Bearer-r15 ENUMERATED {supported} OPTIONAL

}

PDCP-ParametersNR-v1560 ::= SEQUENCE {

 ims-VoNR-PDCP-SCG-NGENDC-r15 ENUMERATED {supported} OPTIONAL

}

ROHC-ProfileSupportList-r15 ::= SEQUENCE {

 profile0x0001-r15 BOOLEAN,

 profile0x0002-r15 BOOLEAN,

 profile0x0003-r15 BOOLEAN,

 profile0x0004-r15 BOOLEAN,

 profile0x0006-r15 BOOLEAN,

 profile0x0101-r15 BOOLEAN,

 profile0x0102-r15 BOOLEAN,

 profile0x0103-r15 BOOLEAN,

 profile0x0104-r15 BOOLEAN

}

SupportedBandListNR-r15 ::= SEQUENCE (SIZE (1..maxBandsNR-r15)) OF SupportedBandNR-r15

SupportedBandNR-r15 ::= SEQUENCE {

 bandNR-r15 FreqBandIndicatorNR-r15

}

IRAT-ParametersUTRA-FDD ::= SEQUENCE {

 supportedBandListUTRA-FDD SupportedBandListUTRA-FDD

}

IRAT-ParametersUTRA-v920 ::= SEQUENCE {

 e-RedirectionUTRA-r9 ENUMERATED {supported}

}

IRAT-ParametersUTRA-v9c0 ::= SEQUENCE {

 voiceOverPS-HS-UTRA-FDD-r9 ENUMERATED {supported} OPTIONAL,

 voiceOverPS-HS-UTRA-TDD128-r9 ENUMERATED {supported} OPTIONAL,

 srvcc-FromUTRA-FDD-ToUTRA-FDD-r9 ENUMERATED {supported} OPTIONAL,

 srvcc-FromUTRA-FDD-ToGERAN-r9 ENUMERATED {supported} OPTIONAL,

 srvcc-FromUTRA-TDD128-ToUTRA-TDD128-r9 ENUMERATED {supported} OPTIONAL,

 srvcc-FromUTRA-TDD128-ToGERAN-r9 ENUMERATED {supported} OPTIONAL

}

IRAT-ParametersUTRA-v9h0 ::= SEQUENCE {

 mfbi-UTRA-r9 ENUMERATED {supported}

}

SupportedBandListUTRA-FDD ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-FDD

SupportedBandUTRA-FDD ::= ENUMERATED {

 bandI, bandII, bandIII, bandIV, bandV, bandVI,

 bandVII, bandVIII, bandIX, bandX, bandXI,

 bandXII, bandXIII, bandXIV, bandXV, bandXVI, ...,

 bandXVII-8a0, bandXVIII-8a0, bandXIX-8a0, bandXX-8a0,

 bandXXI-8a0, bandXXII-8a0, bandXXIII-8a0, bandXXIV-8a0,

 bandXXV-8a0, bandXXVI-8a0, bandXXVII-8a0, bandXXVIII-8a0,

 bandXXIX-8a0, bandXXX-8a0, bandXXXI-8a0, bandXXXII-8a0}

IRAT-ParametersUTRA-TDD128 ::= SEQUENCE {

 supportedBandListUTRA-TDD128 SupportedBandListUTRA-TDD128

}

SupportedBandListUTRA-TDD128 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD128

SupportedBandUTRA-TDD128 ::= ENUMERATED {

 a, b, c, d, e, f, g, h, i, j, k, l, m, n,

 o, p, ...}

IRAT-ParametersUTRA-TDD384 ::= SEQUENCE {

 supportedBandListUTRA-TDD384 SupportedBandListUTRA-TDD384

}

SupportedBandListUTRA-TDD384 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD384

SupportedBandUTRA-TDD384 ::= ENUMERATED {

 a, b, c, d, e, f, g, h, i, j, k, l, m, n,

 o, p, ...}

IRAT-ParametersUTRA-TDD768 ::= SEQUENCE {

 supportedBandListUTRA-TDD768 SupportedBandListUTRA-TDD768

}

SupportedBandListUTRA-TDD768 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD768

SupportedBandUTRA-TDD768 ::= ENUMERATED {

 a, b, c, d, e, f, g, h, i, j, k, l, m, n,

 o, p, ...}

IRAT-ParametersUTRA-TDD-v1020 ::= SEQUENCE {

 e-RedirectionUTRA-TDD-r10 ENUMERATED {supported}

}

IRAT-ParametersGERAN ::= SEQUENCE {

 supportedBandListGERAN SupportedBandListGERAN,

 interRAT-PS-HO-ToGERAN BOOLEAN

}

IRAT-ParametersGERAN-v920 ::= SEQUENCE {

 dtm-r9 ENUMERATED {supported} OPTIONAL,

 e-RedirectionGERAN-r9 ENUMERATED {supported} OPTIONAL

}

SupportedBandListGERAN ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandGERAN

SupportedBandGERAN ::= ENUMERATED {

 gsm450, gsm480, gsm710, gsm750, gsm810, gsm850,

 gsm900P, gsm900E, gsm900R, gsm1800, gsm1900,

 spare5, spare4, spare3, spare2, spare1, ...}

IRAT-ParametersCDMA2000-HRPD ::= SEQUENCE {

 supportedBandListHRPD SupportedBandListHRPD,

 tx-ConfigHRPD ENUMERATED {single, dual},

 rx-ConfigHRPD ENUMERATED {single, dual}

}

SupportedBandListHRPD ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandclassCDMA2000

IRAT-ParametersCDMA2000-1XRTT ::= SEQUENCE {

 supportedBandList1XRTT SupportedBandList1XRTT,

 tx-Config1XRTT ENUMERATED {single, dual},

 rx-Config1XRTT ENUMERATED {single, dual}

}

IRAT-ParametersCDMA2000-1XRTT-v920 ::= SEQUENCE {

 e-CSFB-1XRTT-r9 ENUMERATED {supported},

 e-CSFB-ConcPS-Mob1XRTT-r9 ENUMERATED {supported} OPTIONAL

}

IRAT-ParametersCDMA2000-1XRTT-v1020 ::= SEQUENCE {

 e-CSFB-dual-1XRTT-r10 ENUMERATED {supported}

}

IRAT-ParametersCDMA2000-v1130 ::= SEQUENCE {

 cdma2000-NW-Sharing-r11 ENUMERATED {supported} OPTIONAL

}

SupportedBandList1XRTT ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandclassCDMA2000

IRAT-ParametersWLAN-r13 ::= SEQUENCE {

 supportedBandListWLAN-r13 SEQUENCE (SIZE (1..maxWLAN-Bands-r13)) OF WLAN-BandIndicator-r13 OPTIONAL

}

CSG-ProximityIndicationParameters-r9 ::= SEQUENCE {

 intraFreqProximityIndication-r9 ENUMERATED {supported} OPTIONAL,

 interFreqProximityIndication-r9 ENUMERATED {supported} OPTIONAL,

 utran-ProximityIndication-r9 ENUMERATED {supported} OPTIONAL

}

NeighCellSI-AcquisitionParameters-r9 ::= SEQUENCE {

 intraFreqSI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL,

 interFreqSI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL,

 utran-SI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL

}

NeighCellSI-AcquisitionParameters-v1530 ::= SEQUENCE {

 reportCGI-NR-EN-DC-r15 ENUMERATED {supported} OPTIONAL,

 reportCGI-NR-NoEN-DC-r15 ENUMERATED {supported} OPTIONAL

}

NeighCellSI-AcquisitionParameters-v1550 ::= SEQUENCE {

 eutra-CGI-Reporting-ENDC-r15 ENUMERATED {supported} OPTIONAL,

 utra-GERAN-CGI-Reporting-ENDC-r15 ENUMERATED {supported} OPTIONAL

}

SON-Parameters-r9 ::= SEQUENCE {

 rach-Report-r9 ENUMERATED {supported} OPTIONAL

}

UE-BasedNetwPerfMeasParameters-r10 ::= SEQUENCE {

 loggedMeasurementsIdle-r10 ENUMERATED {supported} OPTIONAL,

 standaloneGNSS-Location-r10 ENUMERATED {supported} OPTIONAL

}

UE-BasedNetwPerfMeasParameters-v1250 ::= SEQUENCE {

 loggedMBSFNMeasurements-r12 ENUMERATED {supported}

}

UE-BasedNetwPerfMeasParameters-v1430 ::= SEQUENCE {

 locationReport-r14 ENUMERATED {supported} OPTIONAL

}

UE-BasedNetwPerfMeasParameters-v1530 ::= SEQUENCE {

 loggedMeasBT-r15 ENUMERATED {supported} OPTIONAL,

 loggedMeasWLAN-r15 ENUMERATED {supported} OPTIONAL,

 immMeasBT-r15 ENUMERATED {supported} OPTIONAL,

 immMeasWLAN-r15 ENUMERATED {supported} OPTIONAL

}

OTDOA-PositioningCapabilities-r10 ::= SEQUENCE {

 otdoa-UE-Assisted-r10 ENUMERATED {supported},

 interFreqRSTD-Measurement-r10 ENUMERATED {supported} OPTIONAL

}

Other-Parameters-r11 ::= SEQUENCE {

 inDeviceCoexInd-r11 ENUMERATED {supported} OPTIONAL,

 powerPrefInd-r11 ENUMERATED {supported} OPTIONAL,

 ue-Rx-TxTimeDiffMeasurements-r11 ENUMERATED {supported} OPTIONAL

}

Other-Parameters-v11d0 ::= SEQUENCE {

 inDeviceCoexInd-UL-CA-r11 ENUMERATED {supported} OPTIONAL

}

Other-Parameters-v1360 ::= SEQUENCE {

 inDeviceCoexInd-HardwareSharingInd-r13 ENUMERATED {supported} OPTIONAL

}

Other-Parameters-v1430 ::= SEQUENCE {

 bwPrefInd-r14 ENUMERATED {supported} OPTIONAL,

 rlm-ReportSupport-r14 ENUMERATED {supported} OPTIONAL

}

OtherParameters-v1450 ::= SEQUENCE {

 overheatingInd-r14 ENUMERATED {supported} OPTIONAL

}

Other-Parameters-v1460 ::= SEQUENCE {

 nonCSG-SI-Reporting-r14 ENUMERATED {supported} OPTIONAL

}

Other-Parameters-v1530 ::= SEQUENCE {

 assistInfoBitForLC-r15 ENUMERATED {supported} OPTIONAL,

 timeReferenceProvision-r15 ENUMERATED {supported} OPTIONAL,

 flightPathPlan-r15 ENUMERATED {supported} OPTIONAL

}

Other-Parameters-v1540 ::= SEQUENCE {

 inDeviceCoexInd-ENDC-r15 ENUMERATED {supported} OPTIONAL

}

MBMS-Parameters-r11 ::= SEQUENCE {

 mbms-SCell-r11 ENUMERATED {supported} OPTIONAL,

 mbms-NonServingCell-r11 ENUMERATED {supported} OPTIONAL

}

MBMS-Parameters-v1250 ::= SEQUENCE {

 mbms-AsyncDC-r12 ENUMERATED {supported} OPTIONAL

}

MBMS-Parameters-v1430 ::= SEQUENCE {

 fembmsDedicatedCell-r14 ENUMERATED {supported} OPTIONAL,

 fembmsMixedCell-r14 ENUMERATED {supported} OPTIONAL,

 subcarrierSpacingMBMS-khz7dot5-r14 ENUMERATED {supported} OPTIONAL,

 subcarrierSpacingMBMS-khz1dot25-r14 ENUMERATED {supported} OPTIONAL

}

MBMS-Parameters-v1470 ::= SEQUENCE {

 mbms-MaxBW-r14 CHOICE {

 implicitValue NULL,

 explicitValue INTEGER(2..20)

 },

 mbms-ScalingFactor1dot25-r14 ENUMERATED {n3, n6, n9, n12} OPTIONAL,

 mbms-ScalingFactor7dot5-r14 ENUMERATED {n1, n2, n3, n4} OPTIONAL

}

FeMBMS-Unicast-Parameters-r14 ::= SEQUENCE {

 unicast-fembmsMixedSCell-r14 ENUMERATED {supported} OPTIONAL,

 emptyUnicastRegion-r14 ENUMERATED {supported} OPTIONAL

}

SCPTM-Parameters-r13 ::= SEQUENCE {

 scptm-ParallelReception-r13 ENUMERATED {supported} OPTIONAL,

 scptm-SCell-r13 ENUMERATED {supported} OPTIONAL,

 scptm-NonServingCell-r13 ENUMERATED {supported} OPTIONAL,

 scptm-AsyncDC-r13 ENUMERATED {supported} OPTIONAL

}

CE-Parameters-r13 ::= SEQUENCE {

 ce-ModeA-r13 ENUMERATED {supported} OPTIONAL,

 ce-ModeB-r13 ENUMERATED {supported} OPTIONAL

}

CE-Parameters-v1320 ::= SEQUENCE {

 intraFreqA3-CE-ModeA-r13 ENUMERATED {supported} OPTIONAL,

 intraFreqA3-CE-ModeB-r13 ENUMERATED {supported} OPTIONAL,

 intraFreqHO-CE-ModeA-r13 ENUMERATED {supported} OPTIONAL,

 intraFreqHO-CE-ModeB-r13 ENUMERATED {supported} OPTIONAL

}

CE-Parameters-v1350 ::= SEQUENCE {

 unicastFrequencyHopping-r13 ENUMERATED {supported} OPTIONAL

}

CE-Parameters-v1370 ::= SEQUENCE {

 tm9-CE-ModeA-r13 ENUMERATED {supported} OPTIONAL,

 tm9-CE-ModeB-r13 ENUMERATED {supported} OPTIONAL

}

CE-Parameters-v1380 ::= SEQUENCE {

 tm6-CE-ModeA-r13 ENUMERATED {supported} OPTIONAL

}

CE-Parameters-v1430 ::= SEQUENCE {

 ce-SwitchWithoutHO-r14 ENUMERATED {supported} OPTIONAL

}

LAA-Parameters-r13 ::= SEQUENCE {

 crossCarrierSchedulingLAA-DL-r13 ENUMERATED {supported} OPTIONAL,

 csi-RS-DRS-RRM-MeasurementsLAA-r13 ENUMERATED {supported} OPTIONAL,

 downlinkLAA-r13 ENUMERATED {supported} OPTIONAL,

 endingDwPTS-r13 ENUMERATED {supported} OPTIONAL,

 secondSlotStartingPosition-r13 ENUMERATED {supported} OPTIONAL,

 tm9-LAA-r13 ENUMERATED {supported} OPTIONAL,

 tm10-LAA-r13 ENUMERATED {supported} OPTIONAL

}

LAA-Parameters-v1430 ::= SEQUENCE {

 crossCarrierSchedulingLAA-UL-r14 ENUMERATED {supported} OPTIONAL,

 uplinkLAA-r14 ENUMERATED {supported} OPTIONAL,

 twoStepSchedulingTimingInfo-r14 ENUMERATED {nPlus1, nPlus2, nPlus3} OPTIONAL,

 uss-BlindDecodingAdjustment-r14 ENUMERATED {supported} OPTIONAL,

 uss-BlindDecodingReduction-r14 ENUMERATED {supported} OPTIONAL,

 outOfSequenceGrantHandling-r14 ENUMERATED {supported} OPTIONAL

}

LAA-Parameters-v1530 ::= SEQUENCE {

 aul-r15 ENUMERATED {supported} OPTIONAL,

 laa-PUSCH-Mode1-r15 ENUMERATED {supported} OPTIONAL,

 laa-PUSCH-Mode2-r15 ENUMERATED {supported} OPTIONAL,

 laa-PUSCH-Mode3-r15 ENUMERATED {supported} OPTIONAL

}

WLAN-IW-Parameters-r12 ::= SEQUENCE {

 wlan-IW-RAN-Rules-r12 ENUMERATED {supported} OPTIONAL,

 wlan-IW-ANDSF-Policies-r12 ENUMERATED {supported} OPTIONAL

}

LWA-Parameters-r13 ::= SEQUENCE {

 lwa-r13 ENUMERATED {supported} OPTIONAL,

 lwa-SplitBearer-r13 ENUMERATED {supported} OPTIONAL,

 wlan-MAC-Address-r13 OCTET STRING (SIZE (6)) OPTIONAL,

 lwa-BufferSize-r13 ENUMERATED {supported} OPTIONAL

}

LWA-Parameters-v1430 ::= SEQUENCE {

 lwa-HO-WithoutWT-Change-r14 ENUMERATED {supported} OPTIONAL,

 lwa-UL-r14 ENUMERATED {supported} OPTIONAL,

 wlan-PeriodicMeas-r14 ENUMERATED {supported} OPTIONAL,

 wlan-ReportAnyWLAN-r14 ENUMERATED {supported} OPTIONAL,

 wlan-SupportedDataRate-r14 INTEGER (1..2048) OPTIONAL

}

LWA-Parameters-v1440 ::= SEQUENCE {

 lwa-RLC-UM-r14 ENUMERATED {supported} OPTIONAL

}

WLAN-IW-Parameters-v1310 ::= SEQUENCE {

 rclwi-r13 ENUMERATED {supported} OPTIONAL

}

LWIP-Parameters-r13 ::= SEQUENCE {

 lwip-r13 ENUMERATED {supported} OPTIONAL

}

LWIP-Parameters-v1430 ::= SEQUENCE {

 lwip-Aggregation-DL-r14 ENUMERATED {supported} OPTIONAL,

 lwip-Aggregation-UL-r14 ENUMERATED {supported} OPTIONAL

}

NAICS-Capability-List-r12 ::= SEQUENCE (SIZE (1..maxNAICS-Entries-r12)) OF NAICS-Capability-Entry-r12

NAICS-Capability-Entry-r12 ::= SEQUENCE {

 numberOfNAICS-CapableCC-r12 INTEGER(1..5),

 numberOfAggregatedPRB-r12 ENUMERATED {

 n50, n75, n100, n125, n150, n175,

 n200, n225, n250, n275, n300, n350,

 n400, n450, n500, spare},

 ...

}

SL-Parameters-r12 ::= SEQUENCE {

 commSimultaneousTx-r12 ENUMERATED {supported} OPTIONAL,

 commSupportedBands-r12 FreqBandIndicatorListEUTRA-r12 OPTIONAL,

 discSupportedBands-r12 SupportedBandInfoList-r12 OPTIONAL,

 discScheduledResourceAlloc-r12 ENUMERATED {supported} OPTIONAL,

 disc-UE-SelectedResourceAlloc-r12 ENUMERATED {supported} OPTIONAL,

 disc-SLSS-r12 ENUMERATED {supported} OPTIONAL,

 discSupportedProc-r12 ENUMERATED {n50, n400} OPTIONAL

}

SL-Parameters-v1310 ::= SEQUENCE {

 discSysInfoReporting-r13 ENUMERATED {supported} OPTIONAL,

 commMultipleTx-r13 ENUMERATED {supported} OPTIONAL,

 discInterFreqTx-r13 ENUMERATED {supported} OPTIONAL,

 discPeriodicSLSS-r13 ENUMERATED {supported} OPTIONAL

}

SL-Parameters-v1430 ::= SEQUENCE {

 zoneBasedPoolSelection-r14 ENUMERATED {supported} OPTIONAL,

 ue-AutonomousWithFullSensing-r14 ENUMERATED {supported} OPTIONAL,

 ue-AutonomousWithPartialSensing-r14 ENUMERATED {supported} OPTIONAL,

 sl-CongestionControl-r14 ENUMERATED {supported} OPTIONAL,

 v2x-TxWithShortResvInterval-r14 ENUMERATED {supported} OPTIONAL,

 v2x-numberTxRxTiming-r14 INTEGER(1..16) OPTIONAL,

 v2x-nonAdjacentPSCCH-PSSCH-r14 ENUMERATED {supported} OPTIONAL,

 slss-TxRx-r14 ENUMERATED {supported} OPTIONAL,

 v2x-SupportedBandCombinationList-r14 V2X-SupportedBandCombination-r14 OPTIONAL

}

SL-Parameters-v1530 ::= SEQUENCE {

 slss-SupportedTxFreq-r15 ENUMERATED {single, multiple} OPTIONAL,

 sl-64QAM-Tx-r15 ENUMERATED {supported} OPTIONAL,

 sl-TxDiversity-r15 ENUMERATED {supported} OPTIONAL,

 ue-CategorySL-r15 UE-CategorySL-r15 OPTIONAL,

 v2x-SupportedBandCombinationList-v1530 V2X-SupportedBandCombination-v1530 OPTIONAL

}

SL-Parameters-v1540 ::= SEQUENCE {

 sl-64QAM-Rx-r15 ENUMERATED {supported} OPTIONAL,

 sl-RateMatchingTBSScaling-r15 ENUMERATED {supported} OPTIONAL,

 sl-LowT2min-r15 ENUMERATED {supported} OPTIONAL,

 v2x-SensingReportingMode3-r15 ENUMERATED {supported} OPTIONAL

}

UE-CategorySL-r15 ::= SEQUENCE {

 ue-CategorySL-C-TX-r15 INTEGER(1..5),

 ue-CategorySL-C-RX-r15 INTEGER(1..4)

}

V2X-SupportedBandCombination-r14 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF V2X-BandCombinationParameters-r14

V2X-SupportedBandCombination-v1530 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF V2X-BandCombinationParameters-v1530

V2X-BandCombinationParameters-r14 ::= SEQUENCE (SIZE (1.. maxSimultaneousBands-r10)) OF V2X-BandParameters-r14

V2X-BandCombinationParameters-v1530 ::= SEQUENCE (SIZE (1.. maxSimultaneousBands-r10)) OF V2X-BandParameters-v1530

SupportedBandInfoList-r12 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandInfo-r12

SupportedBandInfo-r12 ::= SEQUENCE {

 support-r12 ENUMERATED {supported} OPTIONAL

}

FreqBandIndicatorListEUTRA-r12 ::= SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicator-r11

MMTEL-Parameters-r14 ::= SEQUENCE {

 delayBudgetReporting-r14 ENUMERATED {supported} OPTIONAL,

 pusch-Enhancements-r14 ENUMERATED {supported} OPTIONAL,

 recommendedBitRate-r14 ENUMERATED {supported} OPTIONAL,

 recommendedBitRateQuery-r14 ENUMERATED {supported} OPTIONAL

}

SRS-CapabilityPerBandPair-r14 ::= SEQUENCE {

 retuningInfo SEQUENCE {

 rf-RetuningTimeDL-r14 ENUMERATED {n0, n0dot5, n1, n1dot5, n2, n2dot5, n3,

 n3dot5, n4, n4dot5, n5, n5dot5, n6, n6dot5,

 n7, spare1} OPTIONAL,

 rf-RetuningTimeUL-r14 ENUMERATED {n0, n0dot5, n1, n1dot5, n2, n2dot5, n3,

 n3dot5, n4, n4dot5, n5, n5dot5, n6, n6dot5,

 n7, spare1} OPTIONAL

 }

}

SRS-CapabilityPerBandPair-v14b0 ::= SEQUENCE {

 srs-FlexibleTiming-r14 ENUMERATED {supported} OPTIONAL,

 srs-HARQ-ReferenceConfig-r14 ENUMERATED {supported} OPTIONAL

}

HighSpeedEnhParameters-r14 ::= SEQUENCE {

 measurementEnhancements-r14 ENUMERATED {supported} OPTIONAL,

 demodulationEnhancements-r14 ENUMERATED {supported} OPTIONAL,

 prach-Enhancements-r14 ENUMERATED {supported} OPTIONAL

}

-- ASN1STOP

## NR RRC, capability structure, refer to TS38.331

### 6.3.3 UE capability information elements

#### – *AccessStratumRelease*

The IE *AccessStratumRelease* indicates the release supported by the UE.

*AccessStratumRelease* information element

-- ASN1START

-- TAG-ACCESSSTRATUMRELEASE-START

AccessStratumRelease ::= ENUMERATED {

 rel15, spare7, spare6, spare5, spare4, spare3, spare2, spare1, ... }

-- TAG-ACCESSSTRATUMRELEASE-STOP

-- ASN1STOP

#### – *BandCombinationList*

The IE *BandCombinationList* contains a list of NR CA and/or MR-DC band combinations (also including DL only or UL only band).

*BandCombinationList* information element

-- ASN1START

-- TAG-BANDCOMBINATIONLIST-START

BandCombinationList ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination

BandCombinationList-v1540 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1540

BandCombinationList-v1550 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1550

BandCombinationList-v1560 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1560

BandCombinationList-v1570 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1570

BandCombinationList-v16x0 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v16x0

BandCombination ::= SEQUENCE {

 bandList SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters,

 featureSetCombination FeatureSetCombinationId,

 ca-ParametersEUTRA CA-ParametersEUTRA OPTIONAL,

 ca-ParametersNR CA-ParametersNR OPTIONAL,

 mrdc-Parameters MRDC-Parameters OPTIONAL,

 supportedBandwidthCombinationSet BIT STRING (SIZE (1..32)) OPTIONAL,

 powerClass-v1530 ENUMERATED {pc2} OPTIONAL

}

BandCombination-v1540::= SEQUENCE {

 bandList-v1540 SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1540,

 ca-ParametersNR-v1540 CA-ParametersNR-v1540 OPTIONAL

}

BandCombination-v1550 ::= SEQUENCE {

 ca-ParametersNR-v1550 CA-ParametersNR-v1550

}

BandCombination-v1560::= SEQUENCE {

 ne-DC-BC ENUMERATED {supported} OPTIONAL,

 ca-ParametersNRDC CA-ParametersNRDC OPTIONAL,

 ca-ParametersEUTRA-v1560 CA-ParametersEUTRA-v1560 OPTIONAL,

 ca-ParametersNR-v1560 CA-ParametersNR-v1560 OPTIONAL

}

BandCombination-v1570 ::= SEQUENCE {

 ca-ParametersEUTRA-v1570 CA-ParametersEUTRA-v1570

}

BandCombination-v16x0 ::= SEQUENCE {

 ca-ParametersNR-v16xy CA-ParametersNR-v16xy OPTIONAL,

 bandList-v16x0 SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v16x0

}

BandParameters ::= CHOICE {

 eutra SEQUENCE {

 bandEUTRA FreqBandIndicatorEUTRA,

 ca-BandwidthClassDL-EUTRA CA-BandwidthClassEUTRA OPTIONAL,

 ca-BandwidthClassUL-EUTRA CA-BandwidthClassEUTRA OPTIONAL

 },

 nr SEQUENCE {

 bandNR FreqBandIndicatorNR,

 ca-BandwidthClassDL-NR CA-BandwidthClassNR OPTIONAL,

 ca-BandwidthClassUL-NR CA-BandwidthClassNR OPTIONAL

 }

}

BandParameters-v1540 ::= SEQUENCE {

 srs-CarrierSwitch CHOICE {

 nr SEQUENCE {

 srs-SwitchingTimesListNR SEQUENCE (SIZE (1..maxSimultaneousBands)) OF SRS-SwitchingTimeNR

 },

 eutra SEQUENCE {

 srs-SwitchingTimesListEUTRA SEQUENCE (SIZE (1..maxSimultaneousBands)) OF SRS-SwitchingTimeEUTRA

 }

 } OPTIONAL,

 srs-TxSwitch SEQUENCE {

 supportedSRS-TxPortSwitch ENUMERATED {t1r2, t1r4, t2r4, t1r4-t2r4, t1r1, t2r2, t4r4, notSupported},

 txSwitchImpactToRx INTEGER (1..32) OPTIONAL,

 txSwitchWithAnotherBand INTEGER (1..32) OPTIONAL

 } OPTIONAL

}

BandParameters-v16x0 ::= SEQUENCE {

 intraBandInterFreqDiffSCS-DAPS-r16 ENUMERATED {supported} OPTIONAL,

 intraBandIntraFreqDiffSCS-DAPS-r16 ENUMERATED {supported} OPTIONAL,

 intraFreq-DAPS-r16 ENUMERATED {supported} OPTIONAL

}

-- TAG-BANDCOMBINATIONLIST-STOP

-- ASN1STOP

|  |
| --- |
| *BandCombination* field descriptions |
| ***BandCombinationList-v1540, BandCombinationList-v1550, BandCombinationList-v1560, BandCombinationList-v1570***The UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList* (without suffix). |
| ***ca-ParametersNRDC***If the field is included for a band combination in the NR-DC capability container, the field indicates support of NR-DC. Otherwise, the field is absent. |
| ***ne-DC-BC***If the field is included for a band combination in the MR-DC capability container, the field indicates support of NE-DC. Otherwise, the field is absent. |
| ***powerClass***Power class that the UE supports when operating according to this band combination. If the field is absent, the UE supports the default power class. If this power class is higher than the power class that the UE supports on the individual bands of this band combination (*ue-PowerClass* in *BandNR*), the latter determines maximum TX power available in each band. The UE sets the new power class parameter only in band combinations with two FR1 uplink serving cells.  |
| ***supportedBandwidthCombinationSet***For NR SA and for inter-band EN-DC, the field defines the bandwidth combinations for the NR part of the band combination. For intra-band EN-DC, the field indicates the supported bandwidth combination set applicable to the NR and LTE band combinations. The first (left-most) bit in the bitmap corresponds to the BCS#0 and so on. If the bit is set to 1, the UE supports the corresponding BCS. |
| ***srs-SwitchingTimesListNR***Indicates, for a particular pair of NR bands, the RF retuning time when switching between a NR carrier corresponding to this band entry and another (PUSCH-less) NR carrier corresponding to the band entry in the order indicated below:- For the first NR band, the UE shall include the same number of entries for NR bands as in *bandList*, i.e. first entry corresponds to first NR band in *bandList* and so on,- For the second NR band, the UE shall include one entry less, i.e. first entry corresponds to the second NR band in *bandList* and so on- And so on |
| ***srs-SwitchingTimesListEUTRA***Indicates, for a particular pair of E-UTRA bands, the RF retuning time when switching between an E-UTRA carrier corresponding to this band entry and another (PUSCH-less) E-UTRA carrier corresponding to the band entry in the order indicated below:- For the first E-UTRA band, the UE shall include the same number of entries for E-UTRA bands as in *bandList,* i.e. first entry corresponds to first E-UTRA band in *bandList* and so on,- For the second E-UTRA band, the UE shall include one entry less, i.e. first entry corresponds to the second E-UTRA band in *bandList* and so on - And so on |

#### – *CA-BandwidthClassEUTRA*

The IE *CA-BandwidthClassEUTRA* indicates the E-UTRA CA bandwidth class as defined in TS 36.101 [22], table 5.6A-1.

*CA-BandwidthClassEUTRA* information element

-- ASN1START

-- TAG-CA-BANDWIDTHCLASSEUTRA-START

CA-BandwidthClassEUTRA ::= ENUMERATED {a, b, c, d, e, f, ...}

-- TAG-CA-BANDWIDTHCLASSEUTRA-STOP

-- ASN1STOP

#### – *CA-BandwidthClassNR*

The IE *CA-BandwidthClassNR* indicates the NR CA bandwidth class as defined in TS 38.101-1 [15], table 5.3A.5-1 and TS 38.101-2 [39], table 5.3A.4-1.

*CA-BandwidthClassNR* information element

-- ASN1START

-- TAG-CA-BANDWIDTHCLASSNR-START

CA-BandwidthClassNR ::= ENUMERATED {a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, ...}

-- TAG-CA-BANDWIDTHCLASSNR-STOP

-- ASN1STOP

#### – *CA-ParametersEUTRA*

The IE *CA-ParameterEUTRA* contains the E-UTRA part of band combination parameters for a given MR-DC band combination.

NOTE: If additional E-UTRA band combination parameters are defined in TS 36.331 [10], which are supported for MR-DC, they will be defined here as well.

*CA-ParametersEUTRA* information element

-- ASN1START

-- TAG-CA-PARAMETERSEUTRA-START

CA-ParametersEUTRA ::= SEQUENCE {

 multipleTimingAdvance ENUMERATED {supported} OPTIONAL,

 simultaneousRx-Tx ENUMERATED {supported} OPTIONAL,

 supportedNAICS-2CRS-AP BIT STRING (SIZE (1..8)) OPTIONAL,

 additionalRx-Tx-PerformanceReq ENUMERATED {supported} OPTIONAL,

 ue-CA-PowerClass-N ENUMERATED {class2} OPTIONAL,

 supportedBandwidthCombinationSetEUTRA-v1530 BIT STRING (SIZE (1..32)) OPTIONAL,

 ...

}

CA-ParametersEUTRA-v1560 ::= SEQUENCE {

 fd-MIMO-TotalWeightedLayers INTEGER (2..128) OPTIONAL

}

CA-ParametersEUTRA-v1570 ::= SEQUENCE {

 dl-1024QAM-TotalWeightedLayers INTEGER (0..10) OPTIONAL

}

-- TAG-CA-PARAMETERSEUTRA-STOP

-- ASN1STOP

#### – *CA-ParametersNR*

#### The IE *CA-ParametersNR* contains carrier aggregation related capabilities that are defined per band combination.

*CA-ParametersNR* information element

-- ASN1START

-- TAG-CA-PARAMETERSNR-START

CA-ParametersNR ::= SEQUENCE {

 dummy ENUMERATED {supported} OPTIONAL,

 parallelTxSRS-PUCCH-PUSCH ENUMERATED {supported} OPTIONAL,

 parallelTxPRACH-SRS-PUCCH-PUSCH ENUMERATED {supported} OPTIONAL,

 simultaneousRxTxInterBandCA ENUMERATED {supported} OPTIONAL,

 simultaneousRxTxSUL ENUMERATED {supported} OPTIONAL,

 diffNumerologyAcrossPUCCH-Group ENUMERATED {supported} OPTIONAL,

 diffNumerologyWithinPUCCH-GroupSmallerSCS ENUMERATED {supported} OPTIONAL,

 supportedNumberTAG ENUMERATED {n2, n3, n4} OPTIONAL,

 ...

}

CA-ParametersNR-v1540 ::= SEQUENCE {

 simultaneousSRS-AssocCSI-RS-AllCC INTEGER (5..32) OPTIONAL,

 csi-RS-IM-ReceptionForFeedbackPerBandComb SEQUENCE {

 maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC INTEGER (1..64) OPTIONAL,

 totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC INTEGER (2..256) OPTIONAL

 } OPTIONAL,

 simultaneousCSI-ReportsAllCC INTEGER (5..32) OPTIONAL,

 dualPA-Architecture ENUMERATED {supported} OPTIONAL

}

CA-ParametersNR-v1550 ::= SEQUENCE {

 dummy ENUMERATED {supported} OPTIONAL

}

CA-ParametersNR-v1560 ::= SEQUENCE {

 diffNumerologyWithinPUCCH-GroupLargerSCS ENUMERATED {supported} OPTIONAL

}

CA-ParametersNR-v16xy ::= SEQUENCE {

 daps-Parameters-r16 SEQUENCE {

 asyncDAPS-r16 ENUMERATED {supported} OPTIONAL,

 inter-FreqDAPS-r16 ENUMERATED {supported} OPTIONAL,

 pdcch-BlindDetectionSource-r16 INTEGER (2..16) OPTIONAL,-- FFS to be confirmed in RAN1

 pdcch-BlindDetectionTarget-r16 INTEGER (2..16) OPTIONAL, -- FFS to be confirmed in RAN1

 singleUL-TransmissionDAPS-r16 ENUMERATED {supported} OPTIONAL,

 supportedNumberTAG-DAPS-r16 ENUMERATED {n2, n3, n4} OPTIONAL, -- do we need repeat it?

 uplinkPowerSharingDAPS-r16 ENUMERATED {dynamic, semiStaticM1, semiStaticM2, all} OPTIONAL

 }

}

-- TAG-CA-PARAMETERSNR-STOP

-- ASN1STOP

|  |
| --- |
| *CA-ParametersNR field description* |
| ***maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC***Limits the total number of NZP-CSI-RS resources that the NW may configure across all CCs (irrespective of the associated codebook type). The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand*-> *maxNumberSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff*-> *maxNumberSimultaneousNZP-CSI-RS-PerCC*. |
| ***simultaneousCSI-ReportsAllCC***This parameter may further limit *simultaneousCSI-ReportsPerCC* in *MIMO-ParametersPerBand* and *Phy-ParametersFRX-Diff* for each band in a given band combination. |
| ***simultaneousSRS-AssocCSI-RS-AllCC***This parameter may further limit *simultaneousSRS-AssocCSI-RS-PerCC* in *MIMO-ParametersPerBand* and *Phy-ParametersFRX-Diff* for each band in a given band combination. |
| ***totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC***Limits the total number of ports that the NW may configure across all NZP-CSI-RS resources across all CCs (irrespective of the associated codebook type). The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand*-> *totalNumberPortsSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff*-> t*otalNumberPortsSimultaneousNZP-CSI-RS-PerCC*. |

#### – CA-ParametersNRDC

The IE *CA-ParametersNRDC* contains dual connectivity related capabilities that are defined per band combination.

*CA-ParametersNRDC* information element

-- ASN1START

-- TAG-CA-PARAMETERS-NRDC-START

CA-ParametersNRDC ::= SEQUENCE {

 ca-ParametersNR-ForDC CA-ParametersNR OPTIONAL,

 ca-ParametersNR-ForDC-v1540 CA-ParametersNR-v1540 OPTIONAL,

 ca-ParametersNR-ForDC-v1550 CA-ParametersNR-v1550 OPTIONAL,

 ca-ParametersNR-ForDC-v1560 CA-ParametersNR-v1560 OPTIONAL,

 featureSetCombinationDC FeatureSetCombinationId OPTIONAL

}

-- TAG-CA-PARAMETERS-NRDC-STOP

-- ASN1STOP

|  |
| --- |
| *CA-ParametersNRDC* field descriptions |
| ***ca-ParametersNR-forDC (with and without suffix)***If this field is present for a band combination, it reports the UE capabilities when NR-DC is configured with the band combination. If no version of this field (i.e., with and without suffix) is present for a band combination, the *ca-ParametersNR* field versions (with and without suffix) in *BandCombination* are applicable to the UE configured with NR-DC for the band combination. |
| ***featureSetCombinationDC***If this field is present for a band combination, it reports the feature set combination supported for the band combination when NR-DC is configured. If this field is absent for a band combination, the *featureSetCombination* in *BandCombination* (without suffix) is applicable to the UE configured with NR-DC for the band combination. |

#### – *CodebookParameters*

The IE *CodebookParameters* is used to convey codebook related parameters.

*CodebookParameters* information element

-- ASN1START

-- TAG-CODEBOOKPARAMETERS-START

CodebookParameters ::= SEQUENCE {

 type1 SEQUENCE {

 singlePanel SEQUENCE {

 supportedCSI-RS-ResourceList SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,

 modes ENUMERATED {mode1, mode1andMode2},

 maxNumberCSI-RS-PerResourceSet INTEGER (1..8)

 },

 multiPanel SEQUENCE {

 supportedCSI-RS-ResourceList SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,

 modes ENUMERATED {mode1, mode2, both},

 nrofPanels ENUMERATED {n2, n4},

 maxNumberCSI-RS-PerResourceSet INTEGER (1..8)

 } OPTIONAL

 },

 type2 SEQUENCE {

 supportedCSI-RS-ResourceList SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,

 parameterLx INTEGER (2..4),

 amplitudeScalingType ENUMERATED {wideband, widebandAndSubband},

 amplitudeSubsetRestriction ENUMERATED {supported} OPTIONAL

 } OPTIONAL,

 type2-PortSelection SEQUENCE {

 supportedCSI-RS-ResourceList SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,

 parameterLx INTEGER (2..4),

 amplitudeScalingType ENUMERATED {wideband, widebandAndSubband}

 } OPTIONAL

}

SupportedCSI-RS-Resource ::= SEQUENCE {

 maxNumberTxPortsPerResource ENUMERATED {p2, p4, p8, p12, p16, p24, p32},

 maxNumberResourcesPerBand INTEGER (1..64),

 totalNumberTxPortsPerBand INTEGER (2..256)

}

-- TAG-CODEBOOKPARAMETERS-STOP

-- ASN1STOP

#### – *FeatureSetCombination*

The IE *FeatureSetCombination* is a two-dimensional matrix of *FeatureSet* entries.

Each *FeatureSetsPerBand* contains a list of feature sets applicable to the carrier(s) of one band entry of the associated band combination. Across the associated bands, the UE shall support the combination of *FeatureSets* at the same position in the *FeatureSetsPerBand*. All *FeatureSetsPerBand* in one *FeatureSetCombination* must have the same number of entries.

The number of *FeatureSetsPerBand* in the *FeatureSetCombination* must be equal to the number of band entries in an associated band combination. The first *FeatureSetPerBand* applies to the first band entry of the band combination, and so on.

Each *FeatureSet* contains either a pair of NR or E-UTRA feature set IDs for UL and DL.

In case of NR, the actual feature sets for UL and DL are defined in the *FeatureSets* IE and referred to from here by their ID, i.e., their position in the *featureSetsUplink* / *featureSetsDownlink* list in the FeatureSet IE.

In case of E-UTRA, the feature sets referred to from this list are defined in TS 36.331 [10] and conveyed as part of the *UE-EUTRA-Capability* container.

The *FeatureSetUplink* and *FeatureSetDownlink* referred to from the *FeatureSet* comprise, among other information, a set of *FeatureSetUplinkPerCC-Id:s* and *FeatureSetDownlinkPerCC-Id:s*. The number of these per-CC IDs determines the number of carriers that the UE is able to aggregate contiguously in frequency domain in the corresponding band. The number of carriers supported by the UE is also restricted by the bandwidth class indicated in the associated *BandCombination*, if present.

In feature set combinations the UE shall exclude entries for fallback combinations with same capabilities, since the network may anyway assume that the UE supports those.

NOTE 1: The UE may advertise fallback band-combinations in which it supports additional functionality explicitly in two ways: Either by setting FeatureSet IDs to zero (inter-band and intra-band non-contiguous fallback) and by reducing the number of FeatureSet-PerCC Ids in a Feature Set (intra-band contiguous fallback). Or by separate *BandCombination* entries with associated *FeatureSetCombinations*.

NOTE 2: The UE may advertise a *FeatureSetCombination* containing only fallback band combinations. That means, in a *FeatureSetCombination,* each group of *FeatureSets* across the bands may contain at least one pair of *FeatureSetUplinkId* and *FeatureSetDownlinkId* which is set to 0/0.

NOTE 3: The Network configures serving cell(s) and BWP(s) configuration to comply with capabilities derived from the combination of FeatureSets at the same position in the FeatureSetsPerBand, regardless of activated/deactivated serving cell(s) and BWP(s).

*FeatureSetCombination* information element

-- ASN1START

-- TAG-FEATURESETCOMBINATION-START

FeatureSetCombination ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF FeatureSetsPerBand

FeatureSetsPerBand ::= SEQUENCE (SIZE (1..maxFeatureSetsPerBand)) OF FeatureSet

FeatureSet ::= CHOICE {

 eutra SEQUENCE {

 downlinkSetEUTRA FeatureSetEUTRA-DownlinkId,

 uplinkSetEUTRA FeatureSetEUTRA-UplinkId

 },

 nr SEQUENCE {

 downlinkSetNR FeatureSetDownlinkId,

 uplinkSetNR FeatureSetUplinkId

 }

}

-- TAG-FEATURESETCOMBINATION-STOP

-- ASN1STOP

#### – *FeatureSetCombinationId*

The IE *FeatureSetCombinationId* identifies a *FeatureSetCombination*. The *FeatureSetCombinationId* of a *FeatureSetCombination* is the position of the *FeatureSetCombination* in the featureSetCombinations list (in *UE-NR-Capability* or *UE-MRDC-Capability*). The *FeatureSetCombinationId* = 0 refers to the first entry in the *featureSetCombinations* list (in *UE-NR-Capability* or *UE-MRDC-Capability*).

NOTE: The *FeatureSetCombinationId* = 1024 is not used due to the maximum entry number of *featureSetCombinations*.

*FeatureSetCombinationId* information element

-- ASN1START

-- TAG-FEATURESETCOMBINATIONID-START

FeatureSetCombinationId ::= INTEGER (0.. maxFeatureSetCombinations)

-- TAG-FEATURESETCOMBINATIONID-STOP

-- ASN1STOP

#### – *FeatureSetDownlink*

The IE *FeatureSetDownlink* indicates a set of features that the UE supports on the carriers corresponding to one band entry in a band combination.

*FeatureSetDownlink* information element

-- ASN1START

-- TAG-FEATURESETDOWNLINK-START

FeatureSetDownlink ::= SEQUENCE {

 featureSetListPerDownlinkCC SEQUENCE (SIZE (1..maxNrofServingCells)) OF FeatureSetDownlinkPerCC-Id,

 intraBandFreqSeparationDL FreqSeparationClass OPTIONAL,

 scalingFactor ENUMERATED {f0p4, f0p75, f0p8} OPTIONAL,

 crossCarrierScheduling-OtherSCS ENUMERATED {supported} OPTIONAL,

 scellWithoutSSB ENUMERATED {supported} OPTIONAL,

 csi-RS-MeasSCellWithoutSSB ENUMERATED {supported} OPTIONAL,

 dummy1 ENUMERATED {supported} OPTIONAL,

 type1-3-CSS ENUMERATED {supported} OPTIONAL,

 pdcch-MonitoringAnyOccasions ENUMERATED {withoutDCI-Gap, withDCI-Gap} OPTIONAL,

 dummy2 ENUMERATED {supported} OPTIONAL,

 ue-SpecificUL-DL-Assignment ENUMERATED {supported} OPTIONAL,

 searchSpaceSharingCA-DL ENUMERATED {supported} OPTIONAL,

 timeDurationForQCL SEQUENCE {

 scs-60kHz ENUMERATED {s7, s14, s28} OPTIONAL,

 scs-120kHz ENUMERATED {s14, s28} OPTIONAL

 } OPTIONAL,

 pdsch-ProcessingType1-DifferentTB-PerSlot SEQUENCE {

 scs-15kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,

 scs-30kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,

 scs-60kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,

 scs-120kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL

 } OPTIONAL,

 dummy3 DummyA OPTIONAL,

 dummy4 SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyB OPTIONAL,

 dummy5 SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyC OPTIONAL,

 dummy6 SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyD OPTIONAL,

 dummy7 SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyE OPTIONAL

}

FeatureSetDownlink-v1540 ::= SEQUENCE {

 oneFL-DMRS-TwoAdditionalDMRS-DL ENUMERATED {supported} OPTIONAL,

 additionalDMRS-DL-Alt ENUMERATED {supported} OPTIONAL,

 twoFL-DMRS-TwoAdditionalDMRS-DL ENUMERATED {supported} OPTIONAL,

 oneFL-DMRS-ThreeAdditionalDMRS-DL ENUMERATED {supported} OPTIONAL,

 pdcch-MonitoringAnyOccasionsWithSpanGap SEQUENCE {

 scs-15kHz ENUMERATED {set1, set2, set3} OPTIONAL,

 scs-30kHz ENUMERATED {set1, set2, set3} OPTIONAL,

 scs-60kHz ENUMERATED {set1, set2, set3} OPTIONAL,

 scs-120kHz ENUMERATED {set1, set2, set3} OPTIONAL

 } OPTIONAL,

 pdsch-SeparationWithGap ENUMERATED {supported} OPTIONAL,

 pdsch-ProcessingType2 SEQUENCE {

 scs-15kHz ProcessingParameters OPTIONAL,

 scs-30kHz ProcessingParameters OPTIONAL,

 scs-60kHz ProcessingParameters OPTIONAL

 } OPTIONAL,

 pdsch-ProcessingType2-Limited SEQUENCE {

 differentTB-PerSlot-SCS-30kHz ENUMERATED {upto1, upto2, upto4, upto7}

 } OPTIONAL,

 dl-MCS-TableAlt-DynamicIndication ENUMERATED {supported} OPTIONAL

}

DummyA ::= SEQUENCE {

 maxNumberNZP-CSI-RS-PerCC INTEGER (1..32),

 maxNumberPortsAcrossNZP-CSI-RS-PerCC ENUMERATED {p2, p4, p8, p12, p16, p24, p32, p40, p48, p56, p64, p72, p80,

 p88, p96, p104, p112, p120, p128, p136, p144, p152, p160, p168,

 p176, p184, p192, p200, p208, p216, p224, p232, p240, p248, p256},

 maxNumberCS-IM-PerCC ENUMERATED {n1, n2, n4, n8, n16, n32},

 maxNumberSimultaneousCSI-RS-ActBWP-AllCC ENUMERATED {n5, n6, n7, n8, n9, n10, n12, n14, n16, n18, n20, n22, n24, n26,

 n28, n30, n32, n34, n36, n38, n40, n42, n44, n46, n48, n50, n52,

 n54, n56, n58, n60, n62, n64},

 totalNumberPortsSimultaneousCSI-RS-ActBWP-AllCC ENUMERATED {p8, p12, p16, p24, p32, p40, p48, p56, p64, p72, p80,

 p88, p96, p104, p112, p120, p128, p136, p144, p152, p160, p168,

 p176, p184, p192, p200, p208, p216, p224, p232, p240, p248, p256}

}

DummyB ::= SEQUENCE {

 maxNumberTxPortsPerResource ENUMERATED {p2, p4, p8, p12, p16, p24, p32},

 maxNumberResources INTEGER (1..64),

 totalNumberTxPorts INTEGER (2..256),

 supportedCodebookMode ENUMERATED {mode1, mode1AndMode2},

 maxNumberCSI-RS-PerResourceSet INTEGER (1..8)

}

DummyC ::= SEQUENCE {

 maxNumberTxPortsPerResource ENUMERATED {p8, p16, p32},

 maxNumberResources INTEGER (1..64),

 totalNumberTxPorts INTEGER (2..256),

 supportedCodebookMode ENUMERATED {mode1, mode2, both},

 supportedNumberPanels ENUMERATED {n2, n4},

 maxNumberCSI-RS-PerResourceSet INTEGER (1..8)

}

DummyD ::= SEQUENCE {

 maxNumberTxPortsPerResource ENUMERATED {p4, p8, p12, p16, p24, p32},

 maxNumberResources INTEGER (1..64),

 totalNumberTxPorts INTEGER (2..256),

 parameterLx INTEGER (2..4),

 amplitudeScalingType ENUMERATED {wideband, widebandAndSubband},

 amplitudeSubsetRestriction ENUMERATED {supported} OPTIONAL,

 maxNumberCSI-RS-PerResourceSet INTEGER (1..8)

}

DummyE ::= SEQUENCE {

 maxNumberTxPortsPerResource ENUMERATED {p4, p8, p12, p16, p24, p32},

 maxNumberResources INTEGER (1..64),

 totalNumberTxPorts INTEGER (2..256),

 parameterLx INTEGER (2..4),

 amplitudeScalingType ENUMERATED {wideband, widebandAndSubband},

 maxNumberCSI-RS-PerResourceSet INTEGER (1..8)

}

-- TAG-FEATURESETDOWNLINK-STOP

-- ASN1STOP

|  |
| --- |
| *FeatureSetDownlink* field descriptions |
| ***crossCarrierScheduling-OtherSCS***The UE shall set this field to the same value as *crossCarrierScheduling-OtherSCS* in the associated *FeatureSetUplink* (if present). |
| ***featureSetListPerDownlinkCC***Indicates which features the UE supports on the individual carriers of the feature set (and hence of a band entry that refer to the feature set). The UE shall hence include at least as many *FeatureSetDownlinkPerCC-Id* in this list as the number of carriers it supports according to the *ca-BandwidthClassDL*, except if indicating additional functionality by reducing the number of *FeatureSetDownlinkPerCC-Id* in the feature set (see NOTE 1 in *FeatureSetCombination* IE description). The order of the elements in this list is not relevant, i.e., the network may configure any of the carriers in accordance with any of the *FeatureSetDownlinkPerCC-Id* in this list. |

#### – *FeatureSetDownlinkId*

The IE *FeatureSetDownlinkId* identifies a downlink feature set. The *FeatureSetDownlinkId* of a *FeatureSetDownlink* is the index position of the *FeatureSetDownlink* in the *featureSetsDownlink* list in the *FeatureSets* IE. The first element in that list is referred to by *FeatureSetDownlinkId* = 1. The *FeatureSetDownlinkId=0* is not used by an actual *FeatureSetDownlink* but means that the UE does not support a carrier in this band of a band combination.

*FeatureSetDownlinkId* information element

-- ASN1START

-- TAG-FEATURESETDOWNLINKID-START

FeatureSetDownlinkId ::= INTEGER (0..maxDownlinkFeatureSets)

-- TAG-FEATURESETDOWNLINKID-STOP

-- ASN1STOP

#### – *FeatureSetDownlinkPerCC*

The IE *FeatureSetDownlinkPerCC* indicates a set of features that the UE supports on the corresponding carrier of one band entry of a band combination.

*FeatureSetDownlinkPerCC* information element

-- ASN1START

-- TAG-FEATURESETDOWNLINKPERCC-START

FeatureSetDownlinkPerCC ::= SEQUENCE {

 supportedSubcarrierSpacingDL SubcarrierSpacing,

 supportedBandwidthDL SupportedBandwidth,

 channelBW-90mhz ENUMERATED {supported} OPTIONAL,

 maxNumberMIMO-LayersPDSCH MIMO-LayersDL OPTIONAL,

 supportedModulationOrderDL ModulationOrder OPTIONAL

}

-- TAG-FEATURESETDOWNLINKPERCC-STOP

-- ASN1STOP

#### – *FeatureSetDownlinkPerCC-Id*

The IE *FeatureSetDownlinkPerCC-Id* identifies a set of features applicable to one carrier of a feature set. The *FeatureSetDownlinkPerCC-Id* of a *FeatureSetDownlinkPerCC* is the index position of the *FeatureSetDownlinkPerCC* in the *featureSetsDownlinkPerCC*. The first element in the list is referred to by *FeatureSetDownlinkPerCC-Id* = 1, and so on.

*FeatureSetDownlinkPerCC-Id* information element

-- ASN1START

-- TAG-FEATURESETDOWNLINKPERCC-ID-START

FeatureSetDownlinkPerCC-Id ::= INTEGER (1..maxPerCC-FeatureSets)

-- TAG-FEATURESETDOWNLINKPERCC-ID-STOP

-- ASN1STOP

#### – *FeatureSetEUTRA-DownlinkId*

The IE *FeatureSetEUTRA-DownlinkId* identifies a downlink feature set in E-UTRA list (see TS 36.331 [10]. The first element in that list is referred to by *FeatureSetEUTRA-DownlinkId* = 1. The *FeatureSetEUTRA-DownlinkId=0* is used when the UE does not support a carrier in this band of a band combination.

*FeatureSetEUTRA-DownlinkId* information element

-- ASN1START

-- TAG-FEATURESETEUTRADOWNLINKID-START

FeatureSetEUTRA-DownlinkId ::= INTEGER (0..maxEUTRA-DL-FeatureSets)

-- TAG-FEATURESETEUTRADOWNLINKID-STOP

-- ASN1STOP

#### – *FeatureSetEUTRA-UplinkId*

The IE *FeatureSetEUTRA-UplinkId* identifies an uplink feature set in E-UTRA list (see TS 36.331 [10]. The first element in that list is referred to by *FeatureSetEUTRA-UplinkId* = 1. The *FeatureSetEUTRA-UplinkId* *=0* is used when the UE does not support a carrier in this band of a band combination.

*FeatureSetEUTRA-UplinkId* information element

-- ASN1START

-- TAG-FEATURESETEUTRAUPLINKID-START

FeatureSetEUTRA-UplinkId ::= INTEGER (0..maxEUTRA-UL-FeatureSets)

-- TAG-FEATURESETEUTRAUPLINKID-STOP

-- ASN1STOP

#### – *FeatureSets*

The IE *FeatureSets* is used to provide pools of downlink and uplink features sets. A *FeatureSetCombination* refers to the IDs of the feature set(s) that the UE supports in that *FeatureSetCombination*. The *BandCombination* entries in the *BandCombinationList* then indicate the ID of the *FeatureSetCombination* that the UE supports for that band combination.

The entries in the lists in this IE are identified by their index position. For example, the *FeatureSetUplinkPerCC-Id* = 4 identifies the 4th element in the *featureSetsUplinkPerCC* list.

NOTE: When feature sets (per CC) IEs require extension in future versions of the specification, new versions of the *FeatureSetDownlink*, *FeatureSetUplink*, *FeatureSets*, *FeatureSetDownlinkPerCC* and/or *FeatureSetUplinkPerCC* will be created and instantiated in corresponding new lists in the *FeatureSets* IE. For example, if new capability bits are to be added to the *FeatureSetDownlink*, they will instead be defined in a new *FeatureSetDownlink-rxy* which will be instantiated in a new *featureSetDownlinkList-rxy* list. If a UE indicates in a *FeatureSetCombination* that it supports the *FeatureSetDownlink* with ID #5, it implies that it supports both the features in *FeatureSetDownlink* #5 and *FeatureSetDownlink-rxy* #5 (if present). The number of entries in the new list(s) shall be the same as in the original list(s).

*FeatureSets* information element

-- ASN1START

-- TAG-FEATURESETS-START

FeatureSets ::= SEQUENCE {

 featureSetsDownlink SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink OPTIONAL,

 featureSetsDownlinkPerCC SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC OPTIONAL,

 featureSetsUplink SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink OPTIONAL,

 featureSetsUplinkPerCC SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC OPTIONAL,

 ...,

 [[

 featureSetsDownlink-v1540 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1540 OPTIONAL,

 featureSetsUplink-v1540 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1540 OPTIONAL,

 featureSetsUplinkPerCC-v1540 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v1540 OPTIONAL

 ]]

}

-- TAG-FEATURESETS-STOP

-- ASN1STOP

#### – *FeatureSetUplink*

The IE *FeatureSetUplink* is used to indicate the features that the UE supports on the carriers corresponding to one band entry in a band combination.

*FeatureSetUplink* information element

-- ASN1START

-- TAG-FEATURESETUPLINK-START

FeatureSetUplink ::= SEQUENCE {

 featureSetListPerUplinkCC SEQUENCE (SIZE (1.. maxNrofServingCells)) OF FeatureSetUplinkPerCC-Id,

 scalingFactor ENUMERATED {f0p4, f0p75, f0p8} OPTIONAL,

 crossCarrierScheduling-OtherSCS ENUMERATED {supported} OPTIONAL,

 intraBandFreqSeparationUL FreqSeparationClass OPTIONAL,

 searchSpaceSharingCA-UL ENUMERATED {supported} OPTIONAL,

 dummy1 DummyI  OPTIONAL,

 supportedSRS-Resources SRS-Resources OPTIONAL,

 twoPUCCH-Group ENUMERATED {supported} OPTIONAL,

 dynamicSwitchSUL ENUMERATED {supported} OPTIONAL,

 simultaneousTxSUL-NonSUL ENUMERATED {supported} OPTIONAL,

 pusch-ProcessingType1-DifferentTB-PerSlot SEQUENCE {

 scs-15kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,

 scs-30kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,

 scs-60kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,

 scs-120kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL

 } OPTIONAL,

 dummy2 DummyF OPTIONAL

}

FeatureSetUplink-v1540 ::= SEQUENCE {

 zeroSlotOffsetAperiodicSRS ENUMERATED {supported} OPTIONAL,

 pa-PhaseDiscontinuityImpacts ENUMERATED {supported} OPTIONAL,

 pusch-SeparationWithGap ENUMERATED {supported} OPTIONAL,

 pusch-ProcessingType2 SEQUENCE {

 scs-15kHz ProcessingParameters OPTIONAL,

 scs-30kHz ProcessingParameters OPTIONAL,

 scs-60kHz ProcessingParameters OPTIONAL

 } OPTIONAL,

 ul-MCS-TableAlt-DynamicIndication ENUMERATED {supported} OPTIONAL

}

SRS-Resources ::= SEQUENCE {

 maxNumberAperiodicSRS-PerBWP ENUMERATED {n1, n2, n4, n8, n16},

 maxNumberAperiodicSRS-PerBWP-PerSlot INTEGER (1..6),

 maxNumberPeriodicSRS-PerBWP ENUMERATED {n1, n2, n4, n8, n16},

 maxNumberPeriodicSRS-PerBWP-PerSlot INTEGER (1..6),

 maxNumberSemiPersistentSRS-PerBWP ENUMERATED {n1, n2, n4, n8, n16},

 maxNumberSemiPersistentSRS-PerBWP-PerSlot INTEGER (1..6),

 maxNumberSRS-Ports-PerResource ENUMERATED {n1, n2, n4}

}

DummyF ::= SEQUENCE {

 maxNumberPeriodicCSI-ReportPerBWP INTEGER (1..4),

 maxNumberAperiodicCSI-ReportPerBWP INTEGER (1..4),

 maxNumberSemiPersistentCSI-ReportPerBWP INTEGER (0..4),

 simultaneousCSI-ReportsAllCC INTEGER (5..32)

}

-- TAG-FEATURESETUPLINK-STOP

-- ASN1STOP

|  |
| --- |
| *FeatureSetUplink* field descriptions |
| ***crossCarrierScheduling-OtherSCS***The UE shall set this field to the same value as *crossCarrierScheduling-OtherSCS* in the associated *FeatureSetDownlink* (if present). |
| ***featureSetsPerUplinkCC***Indicates which features the UE supports on the individual carriers of the feature set (and hence of a band entry that refers to the feature set). The UE shall hence include at least as many *FeatureSetUplinkPerCC-Id* in this list as the number of carriers it supports according to the *ca-BandwidthClassUL*, except if indicating additional functionality by reducing the number of *FeatureSetUplinkPerCC-Id* in the feature set (see NOTE 1 in *FeatureSetCombination* IE description). The order of the elements in this list is not relevant, i.e., the network may configure any of the carriers in accordance with any of the *FeatureSetUplinkPerCC-Id* in this list. |

#### – *FeatureSetUplinkId*

The IE *FeatureSetUplinkId* identifies an uplink feature set. The *FeatureSetUplinkId* of a *FeatureSetUplink* is the index position of the *FeatureSetUplink* in the *featureSetsUplink* list in the *FeatureSets* IE. The first element in the list is referred to by *FeatureSetUplinkId* = 1, and so on. The *FeatureSetUplinkId =0* is not used by an actual *FeatureSetUplink* but means that the UE does not support a carrier in this band of a band combination.

*FeatureSetUplinkId* information element

-- ASN1START

-- TAG-FEATURESETUPLINKID-START

FeatureSetUplinkId ::= INTEGER (0..maxUplinkFeatureSets)

-- TAG-FEATURESETUPLINKID-STOP

-- ASN1STOP

#### – *FeatureSetUplinkPerCC*

The IE *FeatureSetDownlinkPerCC* indicates a set of features that the UE supports on the corresponding carrier of one band entry of a band combination.

*FeatureSetUplinkPerCC* information element

-- ASN1START

-- TAG-FEATURESETUPLINKPERCC-START

FeatureSetUplinkPerCC ::= SEQUENCE {

 supportedSubcarrierSpacingUL SubcarrierSpacing,

 supportedBandwidthUL SupportedBandwidth,

 channelBW-90mhz ENUMERATED {supported} OPTIONAL,

 mimo-CB-PUSCH SEQUENCE {

 maxNumberMIMO-LayersCB-PUSCH MIMO-LayersUL OPTIONAL,

 maxNumberSRS-ResourcePerSet INTEGER (1..2)

 } OPTIONAL,

 maxNumberMIMO-LayersNonCB-PUSCH MIMO-LayersUL OPTIONAL,

 supportedModulationOrderUL ModulationOrder OPTIONAL

}

FeatureSetUplinkPerCC-v1540 ::= SEQUENCE {

 mimo-NonCB-PUSCH SEQUENCE {

 maxNumberSRS-ResourcePerSet INTEGER (1..4),

 maxNumberSimultaneousSRS-ResourceTx INTEGER (1..4)

 } OPTIONAL

}

-- TAG-FEATURESETUPLINKPERCC-STOP

-- ASN1STOP

#### – *FeatureSetUplinkPerCC-Id*

The IE *FeatureSetUplinkPerCC-Id* identifies a set of features applicable to one carrier of a feature set. The *FeatureSetUplinkPerCC-Id* of a *FeatureSetUplinkPerCC* is the index position of the *FeatureSetUplinkPerCC* in the *featureSetsUplinkPerCC*. The first element in the list is referred to by *FeatureSetUplinkPerCC-Id* = 1, and so on.

*FeatureSetUplinkPerCC-Id* information element

-- ASN1START

-- TAG-FEATURESETUPLINKPERCC-ID-START

FeatureSetUplinkPerCC-Id ::= INTEGER (1..maxPerCC-FeatureSets)

-- TAG-FEATURESETUPLINKPERCC-ID-STOP

-- ASN1STOP

#### – *FreqBandIndicatorEUTRA*

-- ASN1START

-- TAG-FREQBANDINDICATOREUTRA-START

FreqBandIndicatorEUTRA ::= INTEGER (1..maxBandsEUTRA)

-- TAG-FREQBANDINDICATOREUTRA-STOP

-- ASN1STOP

#### – *FreqBandList*

The IE *FreqBandList* is used by the network to request NR CA and/or MR-DC band combinations for specific NR and/or E-UTRA frequency bands and/or up to a specific number of carriers and/or up to specific aggregated bandwidth. This is also used to request feature sets (for NR) and feature set combinations (for NR and MR-DC).

*FreqBandList* information element

-- ASN1START

-- TAG-FREQBANDLIST-START

FreqBandList ::= SEQUENCE (SIZE (1..maxBandsMRDC)) OF FreqBandInformation

FreqBandInformation ::= CHOICE {

 bandInformationEUTRA FreqBandInformationEUTRA,

 bandInformationNR FreqBandInformationNR

}

FreqBandInformationEUTRA ::= SEQUENCE {

 bandEUTRA FreqBandIndicatorEUTRA,

 ca-BandwidthClassDL-EUTRA CA-BandwidthClassEUTRA OPTIONAL, -- Need N

 ca-BandwidthClassUL-EUTRA CA-BandwidthClassEUTRA OPTIONAL -- Need N

}

FreqBandInformationNR ::= SEQUENCE {

 bandNR FreqBandIndicatorNR,

 maxBandwidthRequestedDL AggregatedBandwidth OPTIONAL, -- Need N

 maxBandwidthRequestedUL AggregatedBandwidth OPTIONAL, -- Need N

 maxCarriersRequestedDL INTEGER (1..maxNrofServingCells) OPTIONAL, -- Need N

 maxCarriersRequestedUL INTEGER (1..maxNrofServingCells) OPTIONAL -- Need N

}

AggregatedBandwidth ::= ENUMERATED {mhz50, mhz100, mhz150, mhz200, mhz250, mhz300, mhz350,

 mhz400, mhz450, mhz500, mhz550, mhz600, mhz650, mhz700, mhz750, mhz800}

-- TAG-FREQBANDLIST-STOP

-- ASN1STOP

#### – *FreqSeparationClass*

The IE *FreqSeparationClas*s is used for an intra-band non-contiguous CA band combination to indicate frequency separation between lower edge of lowest CC and upper edge of highest CC in a frequency band.

*FreqSeparationClass* information element

-- ASN1START

-- TAG-FREQSEPARATIONCLASS-START

FreqSeparationClass ::= ENUMERATED {c1, c2, c3, ...}

-- TAG-FREQSEPARATIONCLASS-STOP

-- ASN1STOP

#### – *IMS-Parameters*

The IE *IMS-Parameters* is used to convery capabilities related to IMS.

*IMS-Parameters* information element

-- ASN1START

-- TAG-IMS-PARAMETERS-START

IMS-Parameters ::= SEQUENCE {

 ims-ParametersCommon IMS-ParametersCommon OPTIONAL,

 ims-ParametersFRX-Diff IMS-ParametersFRX-Diff OPTIONAL,

 ...

}

IMS-ParametersCommon ::= SEQUENCE {

 voiceOverEUTRA-5GC ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 voiceOverSCG-BearerEUTRA-5GC ENUMERATED {supported} OPTIONAL

 ]]

}

IMS-ParametersFRX-Diff ::= SEQUENCE {

 voiceOverNR ENUMERATED {supported} OPTIONAL,

 ...

}

-- TAG-IMS-PARAMETERS-STOP

-- ASN1STOP

#### – *InterRAT-Parameters*

The IE *InterRAT-Parameters* is used convey UE capabilities related to the other RATs.

*InterRAT-Parameters* information element

-- ASN1START

-- TAG-INTERRAT-PARAMETERS-START

InterRAT-Parameters ::= SEQUENCE {

 eutra EUTRA-Parameters OPTIONAL,

 ...

}

EUTRA-Parameters ::= SEQUENCE {

 supportedBandListEUTRA SEQUENCE (SIZE (1..maxBandsEUTRA)) OF FreqBandIndicatorEUTRA,

 eutra-ParametersCommon EUTRA-ParametersCommon OPTIONAL,

 eutra-ParametersXDD-Diff EUTRA-ParametersXDD-Diff OPTIONAL,

 ...

}

EUTRA-ParametersCommon ::= SEQUENCE {

 mfbi-EUTRA ENUMERATED {supported} OPTIONAL,

 modifiedMPR-BehaviorEUTRA BIT STRING (SIZE (32)) OPTIONAL,

 multiNS-Pmax-EUTRA ENUMERATED {supported} OPTIONAL,

 rs-SINR-MeasEUTRA ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 ne-DC ENUMERATED {supported} OPTIONAL

 ]]

}

EUTRA-ParametersXDD-Diff ::= SEQUENCE {

 rsrqMeasWidebandEUTRA ENUMERATED {supported} OPTIONAL,

 ...

}

-- TAG-INTERRAT-PARAMETERS-STOP

-- ASN1STOP

#### – *MAC-Parameters*

The IE *MAC-Parameters* is used to convey capabilities related to MAC.

*MAC-Parameters* information element

-- ASN1START

-- TAG-MAC-PARAMETERS-START

MAC-Parameters ::= SEQUENCE {

 mac-ParametersCommon MAC-ParametersCommon OPTIONAL,

 mac-ParametersXDD-Diff MAC-ParametersXDD-Diff OPTIONAL

}

MAC-ParametersCommon ::= SEQUENCE {

 lcp-Restriction ENUMERATED {supported} OPTIONAL,

 dummy ENUMERATED {supported} OPTIONAL,

 lch-ToSCellRestriction ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 recommendedBitRate ENUMERATED {supported} OPTIONAL,

 recommendedBitRateQuery ENUMERATED {supported} OPTIONAL

 ]]

}

MAC-ParametersXDD-Diff ::= SEQUENCE {

 skipUplinkTxDynamic ENUMERATED {supported} OPTIONAL,

 logicalChannelSR-DelayTimer ENUMERATED {supported} OPTIONAL,

 longDRX-Cycle ENUMERATED {supported} OPTIONAL,

 shortDRX-Cycle ENUMERATED {supported} OPTIONAL,

 multipleSR-Configurations ENUMERATED {supported} OPTIONAL,

 multipleConfiguredGrants ENUMERATED {supported} OPTIONAL,

 ...

}

-- TAG-MAC-PARAMETERS-STOP

-- ASN1STOP

#### – *MeasAndMobParameters*

The IE *MeasAndMobParameters* is used to convey UE capabilities related to measurements for radio resource management (RRM), radio link monitoring (RLM) and mobility (e.g. handover).

*MeasAndMobParameters* information element

-- ASN1START

-- TAG-MEASANDMOBPARAMETERS-START

MeasAndMobParameters ::= SEQUENCE {

 measAndMobParametersCommon MeasAndMobParametersCommon OPTIONAL,

 measAndMobParametersXDD-Diff MeasAndMobParametersXDD-Diff OPTIONAL,

 measAndMobParametersFRX-Diff MeasAndMobParametersFRX-Diff OPTIONAL

}

MeasAndMobParametersCommon ::= SEQUENCE {

 supportedGapPattern BIT STRING (SIZE (22)) OPTIONAL,

 ssb-RLM ENUMERATED {supported} OPTIONAL,

 ssb-AndCSI-RS-RLM ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 eventB-MeasAndReport ENUMERATED {supported} OPTIONAL,

 handoverFDD-TDD ENUMERATED {supported} OPTIONAL,

 eutra-CGI-Reporting ENUMERATED {supported} OPTIONAL,

 nr-CGI-Reporting ENUMERATED {supported} OPTIONAL

 ]],

 [[

 independentGapConfig ENUMERATED {supported} OPTIONAL,

 periodicEUTRA-MeasAndReport ENUMERATED {supported} OPTIONAL,

 handoverFR1-FR2 ENUMERATED {supported} OPTIONAL,

 maxNumberCSI-RS-RRM-RS-SINR ENUMERATED {n4, n8, n16, n32, n64, n96} OPTIONAL

 ]],

 [[

 nr-CGI-Reporting-ENDC ENUMERATED {supported} OPTIONAL

 ]],

 [[

 choFDD-TDD-r16 ENUMERATED {supported} OPTIONAL

 ]]

}

MeasAndMobParametersXDD-Diff ::= SEQUENCE {

 intraAndInterF-MeasAndReport ENUMERATED {supported} OPTIONAL,

 eventA-MeasAndReport ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 handoverInterF ENUMERATED {supported} OPTIONAL,

 handoverLTE-EPC ENUMERATED {supported} OPTIONAL,

 handoverLTE-5GC ENUMERATED {supported} OPTIONAL

 ]],

 [[

 sftd-MeasNR-Neigh ENUMERATED {supported} OPTIONAL,

 sftd-MeasNR-Neigh-DRX ENUMERATED {supported} OPTIONAL

 ]],

 [[

 cho-r16 ENUMERATED {supported} OPTIONAL,

 cho-Failure-r16 ENUMERATED {supported} OPTIONAL,

 cho-MaxCells-r16 INTEGER (2..8) OPTIONAL, --FFS

 twoTriggerEvents-r16 ENUMERATED {supported} OPTIONAL, --FFS

 pcellT312-r16 ENUMERATED {supported} OPTIONAL,

 pscellT312-r16 ENUMERATED {supported} OPTIONAL

 ]]

}

MeasAndMobParametersFRX-Diff ::= SEQUENCE {

 ss-SINR-Meas ENUMERATED {supported} OPTIONAL,

 csi-RSRP-AndRSRQ-MeasWithSSB ENUMERATED {supported} OPTIONAL,

 csi-RSRP-AndRSRQ-MeasWithoutSSB ENUMERATED {supported} OPTIONAL,

 csi-SINR-Meas ENUMERATED {supported} OPTIONAL,

 csi-RS-RLM ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 handoverInterF ENUMERATED {supported} OPTIONAL,

 handoverLTE-EPC ENUMERATED {supported} OPTIONAL,

 handoverLTE-5GC ENUMERATED {supported} OPTIONAL

 ]],

 [[

 maxNumberResource-CSI-RS-RLM ENUMERATED {n2, n4, n6, n8} OPTIONAL

 ]],

 [[

 simultaneousRxDataSSB-DiffNumerology ENUMERATED {supported} OPTIONAL

 ]],

 [[

 cho-r16 ENUMERATED {supported} OPTIONAL,

 cho-Failure-r16 ENUMERATED {supported} OPTIONAL,

 cho-MaxCells-r16 INTEGER (2..8) OPTIONAL, --FFS

 twoTriggerEvents-r16 ENUMERATED {supported} OPTIONAL, --FFS

 pcellT312-r16 ENUMERATED {supported} OPTIONAL,

 pscellT312-r16 ENUMERATED {supported} OPTIONAL

 ]]

}

-- TAG-MEASANDMOBPARAMETERS-STOP

-- ASN1STOP

#### – *MeasAndMobParametersMRDC*

The IE *MeasAndMobParametersMRDC* is used to convey capability parameters related to RRM measurements and RRC mobility.

*MeasAndMobParametersMRDC* information element

-- ASN1START

-- TAG-MEASANDMOBPARAMETERSMRDC-START

MeasAndMobParametersMRDC ::= SEQUENCE {

 measAndMobParametersMRDC-Common MeasAndMobParametersMRDC-Common OPTIONAL,

 measAndMobParametersMRDC-XDD-Diff MeasAndMobParametersMRDC-XDD-Diff OPTIONAL,

 measAndMobParametersMRDC-FRX-Diff MeasAndMobParametersMRDC-FRX-Diff OPTIONAL

}

MeasAndMobParametersMRDC-v1560 ::= SEQUENCE {

 measAndMobParametersMRDC-XDD-Diff-v1560 MeasAndMobParametersMRDC-XDD-Diff-v1560 OPTIONAL

}

MeasAndMobParametersMRDC-Common ::= SEQUENCE {

 independentGapConfig ENUMERATED {supported} OPTIONAL

}

MeasAndMobParametersMRDC-XDD-Diff ::= SEQUENCE {

 sftd-MeasPSCell ENUMERATED {supported} OPTIONAL,

 sftd-MeasNR-Cell ENUMERATED {supported} OPTIONAL

}

MeasAndMobParametersMRDC-XDD-Diff-v1560 ::= SEQUENCE {

 sftd-MeasPSCell-NEDC ENUMERATED {supported} OPTIONAL

}

MeasAndMobParametersMRDC-FRX-Diff ::= SEQUENCE {

 simultaneousRxDataSSB-DiffNumerology ENUMERATED {supported} OPTIONAL

}

-- TAG-MEASANDMOBPARAMETERSMRDC-STOP

-- ASN1STOP

#### – *MIMO-Layers*

The IE *MIMO-Layers* is used to convey the number of supported MIMO layers.

*MIMO-Layers* information element

-- ASN1START

-- TAG-MIMO-LAYERS-START

MIMO-LayersDL ::= ENUMERATED {twoLayers, fourLayers, eightLayers}

MIMO-LayersUL ::= ENUMERATED {oneLayer, twoLayers, fourLayers}

-- TAG-MIMO-LAYERS-STOP

-- ASN1STOP

#### – *MIMO-ParametersPerBand*

The IE *MIMO-ParametersPerBand* is used to convey MIMO related parameters specific for a certain band (not per feature set or band combination).

*MIMO-ParametersPerBand* information element

-- ASN1START

-- TAG-MIMO-PARAMETERSPERBAND-START

MIMO-ParametersPerBand ::= SEQUENCE {

 tci-StatePDSCH SEQUENCE {

 maxNumberConfiguredTCIstatesPerCC ENUMERATED {n4, n8, n16, n32, n64, n128} OPTIONAL,

 maxNumberActiveTCI-PerBWP ENUMERATED {n1, n2, n4, n8} OPTIONAL

 } OPTIONAL,

 additionalActiveTCI-StatePDCCH ENUMERATED {supported} OPTIONAL,

 pusch-TransCoherence ENUMERATED {nonCoherent, partialCoherent, fullCoherent} OPTIONAL,

 beamCorrespondenceWithoutUL-BeamSweeping ENUMERATED {supported} OPTIONAL,

 periodicBeamReport ENUMERATED {supported} OPTIONAL,

 aperiodicBeamReport ENUMERATED {supported} OPTIONAL,

 sp-BeamReportPUCCH ENUMERATED {supported} OPTIONAL,

 sp-BeamReportPUSCH ENUMERATED {supported} OPTIONAL,

 dummy1 DummyG OPTIONAL,

 maxNumberRxBeam INTEGER (2..8) OPTIONAL,

 maxNumberRxTxBeamSwitchDL SEQUENCE {

 scs-15kHz ENUMERATED {n4, n7, n14} OPTIONAL,

 scs-30kHz ENUMERATED {n4, n7, n14} OPTIONAL,

 scs-60kHz ENUMERATED {n4, n7, n14} OPTIONAL,

 scs-120kHz ENUMERATED {n4, n7, n14} OPTIONAL,

 scs-240kHz ENUMERATED {n4, n7, n14} OPTIONAL

 } OPTIONAL,

 maxNumberNonGroupBeamReporting ENUMERATED {n1, n2, n4} OPTIONAL,

 groupBeamReporting ENUMERATED {supported} OPTIONAL,

 uplinkBeamManagement SEQUENCE {

 maxNumberSRS-ResourcePerSet-BM ENUMERATED {n2, n4, n8, n16},

 maxNumberSRS-ResourceSet INTEGER (1..8)

 } OPTIONAL,

 maxNumberCSI-RS-BFD INTEGER (1..64) OPTIONAL,

 maxNumberSSB-BFD INTEGER (1..64) OPTIONAL,

 maxNumberCSI-RS-SSB-CBD INTEGER (1..256) OPTIONAL,

 dummy2 ENUMERATED {supported} OPTIONAL,

 twoPortsPTRS-UL ENUMERATED {supported} OPTIONAL,

 dummy5 SRS-Resources OPTIONAL,

 dummy3 INTEGER (1..4) OPTIONAL,

 beamReportTiming SEQUENCE {

 scs-15kHz ENUMERATED {sym2, sym4, sym8} OPTIONAL,

 scs-30kHz ENUMERATED {sym4, sym8, sym14, sym28} OPTIONAL,

 scs-60kHz ENUMERATED {sym8, sym14, sym28} OPTIONAL,

 scs-120kHz ENUMERATED {sym14, sym28, sym56} OPTIONAL

 } OPTIONAL,

 ptrs-DensityRecommendationSetDL SEQUENCE {

 scs-15kHz PTRS-DensityRecommendationDL OPTIONAL,

 scs-30kHz PTRS-DensityRecommendationDL OPTIONAL,

 scs-60kHz PTRS-DensityRecommendationDL OPTIONAL,

 scs-120kHz PTRS-DensityRecommendationDL OPTIONAL

 } OPTIONAL,

 ptrs-DensityRecommendationSetUL SEQUENCE {

 scs-15kHz PTRS-DensityRecommendationUL OPTIONAL,

 scs-30kHz PTRS-DensityRecommendationUL OPTIONAL,

 scs-60kHz PTRS-DensityRecommendationUL OPTIONAL,

 scs-120kHz PTRS-DensityRecommendationUL OPTIONAL

 } OPTIONAL,

 dummy4 DummyH OPTIONAL,

 aperiodicTRS ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 dummy6 ENUMERATED {true} OPTIONAL,

 beamManagementSSB-CSI-RS BeamManagementSSB-CSI-RS OPTIONAL,

 beamSwitchTiming SEQUENCE {

 scs-60kHz ENUMERATED {sym14, sym28, sym48, sym224, sym336} OPTIONAL,

 scs-120kHz ENUMERATED {sym14, sym28, sym48, sym224, sym336} OPTIONAL

 } OPTIONAL,

 codebookParameters CodebookParameters OPTIONAL,

 csi-RS-IM-ReceptionForFeedback CSI-RS-IM-ReceptionForFeedback OPTIONAL,

 csi-RS-ProcFrameworkForSRS CSI-RS-ProcFrameworkForSRS OPTIONAL,

 csi-ReportFramework CSI-ReportFramework OPTIONAL,

 csi-RS-ForTracking CSI-RS-ForTracking OPTIONAL,

 srs-AssocCSI-RS SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource OPTIONAL,

 spatialRelations SpatialRelations OPTIONAL

 ]]

}

DummyG ::= SEQUENCE {

 maxNumberSSB-CSI-RS-ResourceOneTx ENUMERATED {n8, n16, n32, n64},

 maxNumberSSB-CSI-RS-ResourceTwoTx ENUMERATED {n0, n4, n8, n16, n32, n64},

 supportedCSI-RS-Density ENUMERATED {one, three, oneAndThree}

}

BeamManagementSSB-CSI-RS ::= SEQUENCE {

 maxNumberSSB-CSI-RS-ResourceOneTx ENUMERATED {n0, n8, n16, n32, n64},

 maxNumberCSI-RS-Resource ENUMERATED {n0, n4, n8, n16, n32, n64},

 maxNumberCSI-RS-ResourceTwoTx ENUMERATED {n0, n4, n8, n16, n32, n64},

 supportedCSI-RS-Density ENUMERATED {one, three, oneAndThree} OPTIONAL,

 maxNumberAperiodicCSI-RS-Resource ENUMERATED {n0, n1, n4, n8, n16, n32, n64}

}

DummyH ::= SEQUENCE {

 burstLength INTEGER (1..2),

 maxSimultaneousResourceSetsPerCC INTEGER (1..8),

 maxConfiguredResourceSetsPerCC INTEGER (1..64),

 maxConfiguredResourceSetsAllCC INTEGER (1..128)

}

CSI-RS-ForTracking ::= SEQUENCE {

 maxBurstLength INTEGER (1..2),

 maxSimultaneousResourceSetsPerCC INTEGER (1..8),

 maxConfiguredResourceSetsPerCC INTEGER (1..64),

 maxConfiguredResourceSetsAllCC INTEGER (1..256)

}

CSI-RS-IM-ReceptionForFeedback ::= SEQUENCE {

 maxConfigNumberNZP-CSI-RS-PerCC INTEGER (1..64),

 maxConfigNumberPortsAcrossNZP-CSI-RS-PerCC INTEGER (2..256),

 maxConfigNumberCSI-IM-PerCC ENUMERATED {n1, n2, n4, n8, n16, n32},

 maxNumberSimultaneousNZP-CSI-RS-PerCC INTEGER (1..64),

 totalNumberPortsSimultaneousNZP-CSI-RS-PerCC INTEGER (2..256)

}

CSI-RS-ProcFrameworkForSRS ::= SEQUENCE {

 maxNumberPeriodicSRS-AssocCSI-RS-PerBWP INTEGER (1..4),

 maxNumberAperiodicSRS-AssocCSI-RS-PerBWP INTEGER (1..4),

 maxNumberSP-SRS-AssocCSI-RS-PerBWP INTEGER (0..4),

 simultaneousSRS-AssocCSI-RS-PerCC INTEGER (1..8)

}

CSI-ReportFramework ::= SEQUENCE {

 maxNumberPeriodicCSI-PerBWP-ForCSI-Report INTEGER (1..4),

 maxNumberAperiodicCSI-PerBWP-ForCSI-Report INTEGER (1..4),

 maxNumberSemiPersistentCSI-PerBWP-ForCSI-Report INTEGER (0..4),

 maxNumberPeriodicCSI-PerBWP-ForBeamReport INTEGER (1..4),

 maxNumberAperiodicCSI-PerBWP-ForBeamReport INTEGER (1..4),

 maxNumberAperiodicCSI-triggeringStatePerCC ENUMERATED {n3, n7, n15, n31, n63, n128},

 maxNumberSemiPersistentCSI-PerBWP-ForBeamReport INTEGER (0..4),

 simultaneousCSI-ReportsPerCC INTEGER (1..8)

}

PTRS-DensityRecommendationDL ::= SEQUENCE {

 frequencyDensity1 INTEGER (1..276),

 frequencyDensity2 INTEGER (1..276),

 timeDensity1 INTEGER (0..29),

 timeDensity2 INTEGER (0..29),

 timeDensity3 INTEGER (0..29)

}

PTRS-DensityRecommendationUL ::= SEQUENCE {

 frequencyDensity1 INTEGER (1..276),

 frequencyDensity2 INTEGER (1..276),

 timeDensity1 INTEGER (0..29),

 timeDensity2 INTEGER (0..29),

 timeDensity3 INTEGER (0..29),

 sampleDensity1 INTEGER (1..276),

 sampleDensity2 INTEGER (1..276),

 sampleDensity3 INTEGER (1..276),

 sampleDensity4 INTEGER (1..276),

 sampleDensity5 INTEGER (1..276)

}

SpatialRelations ::= SEQUENCE {

 maxNumberConfiguredSpatialRelations ENUMERATED {n4, n8, n16, n32, n64, n96},

 maxNumberActiveSpatialRelations ENUMERATED {n1, n2, n4, n8, n14},

 additionalActiveSpatialRelationPUCCH ENUMERATED {supported} OPTIONAL,

 maxNumberDL-RS-QCL-TypeD ENUMERATED {n1, n2, n4, n8, n14}

}

DummyI ::= SEQUENCE {

 supportedSRS-TxPortSwitch ENUMERATED {t1r2, t1r4, t2r4, t1r4-t2r4, tr-equal},

 txSwitchImpactToRx ENUMERATED {true} OPTIONAL

}

-- TAG-MIMO-PARAMETERSPERBAND-STOP

-- ASN1STOP

|  |
| --- |
| *MIMO-ParametersPerBand field description* |
| ***csi-RS-IM-ReceptionForFeedback/ csi-RS-ProcFrameworkForSRS/ csi-ReportFramework***CSI related capabilities which the UE supports on each of the carriers operated on this band. For mixed FR1-FR2 band combinations these values may be further limited by the corresponding fields in *Phy-ParametersFRX-Diff*. |

#### – *ModulationOrder*

The IE *ModulationOrder* is used to convey the maximum supported modulation order.

*ModulationOrder* information element

-- ASN1START

-- TAG-MODULATIONORDER-START

ModulationOrder ::= ENUMERATED {bpsk-halfpi, bpsk, qpsk, qam16, qam64, qam256}

-- TAG-MODULATIONORDER-STOP

-- ASN1STOP

#### – *MRDC-Parameters*

The IE *MRDC-Parameters* contains the band combination parameters specific to MR-DC for a given MR-DC band combination.

*MRDC-Parameters* information element

-- ASN1START

-- TAG-MRDC-PARAMETERS-START

MRDC-Parameters ::= SEQUENCE {

 singleUL-Transmission ENUMERATED {supported} OPTIONAL,

 dynamicPowerSharing ENUMERATED {supported} OPTIONAL,

 tdm-Pattern ENUMERATED {supported} OPTIONAL,

 ul-SharingEUTRA-NR ENUMERATED {tdm, fdm, both} OPTIONAL,

 ul-SwitchingTimeEUTRA-NR ENUMERATED {type1, type2} OPTIONAL,

 simultaneousRxTxInterBandENDC ENUMERATED {supported} OPTIONAL,

 asyncIntraBandENDC ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 dualPA-Architecture ENUMERATED {supported} OPTIONAL,

 intraBandENDC-Support-v1540 ENUMERATED {non-contiguous, both} OPTIONAL,

 ul-TimingAlignmentEUTRA-NR ENUMERATED {required} OPTIONAL

 ]]

}

-- TAG-MRDC-PARAMETERS-STOP

-- ASN1STOP

#### – *NRDC-Parameters*

The IE *NRDC-Parameters* contains parameters specific to NR-DC, i.e., which are not applicable to NR SA.

*NRDC-Parameters* information element

-- ASN1START

-- TAG-NRDC-PARAMETERS-START

NRDC-Parameters ::= SEQUENCE {

 measAndMobParametersNRDC MeasAndMobParametersMRDC OPTIONAL,

 generalParametersNRDC GeneralParametersMRDC-XDD-Diff OPTIONAL,

 fdd-Add-UE-NRDC-Capabilities UE-MRDC-CapabilityAddXDD-Mode OPTIONAL,

 tdd-Add-UE-NRDC-Capabilities UE-MRDC-CapabilityAddXDD-Mode OPTIONAL,

 fr1-Add-UE-NRDC-Capabilities UE-MRDC-CapabilityAddFRX-Mode OPTIONAL,

 fr2-Add-UE-NRDC-Capabilities UE-MRDC-CapabilityAddFRX-Mode OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 dummy SEQUENCE {} OPTIONAL

}

NRDC-Parameters-v1570 ::= SEQUENCE {

 sfn-SyncNRDC ENUMERATED {supported} OPTIONAL

}

-- TAG-NRDC-PARAMETERS-STOP

-- ASN1STOP

#### – *PDCP-Parameters*

The IE *PDCP-Parameters* is used to convey capabilities related to PDCP.

*PDCP-Parameters* information element

-- ASN1START

-- TAG-PDCP-PARAMETERS-START

PDCP-Parameters ::= SEQUENCE {

 supportedROHC-Profiles SEQUENCE {

 profile0x0000 BOOLEAN,

 profile0x0001 BOOLEAN,

 profile0x0002 BOOLEAN,

 profile0x0003 BOOLEAN,

 profile0x0004 BOOLEAN,

 profile0x0006 BOOLEAN,

 profile0x0101 BOOLEAN,

 profile0x0102 BOOLEAN,

 profile0x0103 BOOLEAN,

 profile0x0104 BOOLEAN

 },

 maxNumberROHC-ContextSessions ENUMERATED {cs2, cs4, cs8, cs12, cs16, cs24, cs32, cs48, cs64,

 cs128, cs256, cs512, cs1024, cs16384, spare2, spare1},

 uplinkOnlyROHC-Profiles ENUMERATED {supported} OPTIONAL,

 continueROHC-Context ENUMERATED {supported} OPTIONAL,

 outOfOrderDelivery ENUMERATED {supported} OPTIONAL,

 shortSN ENUMERATED {supported} OPTIONAL,

 pdcp-DuplicationSRB ENUMERATED {supported} OPTIONAL,

 pdcp-DuplicationMCG-OrSCG-DRB ENUMERATED {supported} OPTIONAL,

 ...

}

-- TAG-PDCP-PARAMETERS-STOP

-- ASN1STOP

#### – *PDCP-ParametersMRDC*

The IE *PDCP-ParametersMRDC* is used to convey PDCP related capabilities for MR-DC.

*PDCP-ParametersMRDC* information element

-- ASN1START

-- TAG-PDCP-PARAMETERSMRDC-START

PDCP-ParametersMRDC ::= SEQUENCE {

 pdcp-DuplicationSplitSRB ENUMERATED {supported} OPTIONAL,

 pdcp-DuplicationSplitDRB ENUMERATED {supported} OPTIONAL

}

-- TAG-PDCP-PARAMETERSMRDC-STOP

-- ASN1STOP

#### – *Phy-Parameters*

The IE *Phy-Parameters* is used to convey the physical layer capabilities.

*Phy-Parameters* information element

-- ASN1START

-- TAG-PHY-PARAMETERS-START

Phy-Parameters ::= SEQUENCE {

 phy-ParametersCommon Phy-ParametersCommon OPTIONAL,

 phy-ParametersXDD-Diff Phy-ParametersXDD-Diff OPTIONAL,

 phy-ParametersFRX-Diff Phy-ParametersFRX-Diff OPTIONAL,

 phy-ParametersFR1 Phy-ParametersFR1 OPTIONAL,

 phy-ParametersFR2 Phy-ParametersFR2 OPTIONAL

}

Phy-ParametersCommon ::= SEQUENCE {

 csi-RS-CFRA-ForHO ENUMERATED {supported} OPTIONAL,

 dynamicPRB-BundlingDL ENUMERATED {supported} OPTIONAL,

 sp-CSI-ReportPUCCH ENUMERATED {supported} OPTIONAL,

 sp-CSI-ReportPUSCH ENUMERATED {supported} OPTIONAL,

 nzp-CSI-RS-IntefMgmt ENUMERATED {supported} OPTIONAL,

 type2-SP-CSI-Feedback-LongPUCCH ENUMERATED {supported} OPTIONAL,

 precoderGranularityCORESET ENUMERATED {supported} OPTIONAL,

 dynamicHARQ-ACK-Codebook ENUMERATED {supported} OPTIONAL,

 semiStaticHARQ-ACK-Codebook ENUMERATED {supported} OPTIONAL,

 spatialBundlingHARQ-ACK ENUMERATED {supported} OPTIONAL,

 dynamicBetaOffsetInd-HARQ-ACK-CSI ENUMERATED {supported} OPTIONAL,

 pucch-Repetition-F1-3-4 ENUMERATED {supported} OPTIONAL,

 ra-Type0-PUSCH ENUMERATED {supported} OPTIONAL,

 dynamicSwitchRA-Type0-1-PDSCH ENUMERATED {supported} OPTIONAL,

 dynamicSwitchRA-Type0-1-PUSCH ENUMERATED {supported} OPTIONAL,

 pdsch-MappingTypeA ENUMERATED {supported} OPTIONAL,

 pdsch-MappingTypeB ENUMERATED {supported} OPTIONAL,

 interleavingVRB-ToPRB-PDSCH ENUMERATED {supported} OPTIONAL,

 interSlotFreqHopping-PUSCH ENUMERATED {supported} OPTIONAL,

 type1-PUSCH-RepetitionMultiSlots ENUMERATED {supported} OPTIONAL,

 type2-PUSCH-RepetitionMultiSlots ENUMERATED {supported} OPTIONAL,

 pusch-RepetitionMultiSlots ENUMERATED {supported} OPTIONAL,

 pdsch-RepetitionMultiSlots ENUMERATED {supported} OPTIONAL,

 downlinkSPS ENUMERATED {supported} OPTIONAL,

 configuredUL-GrantType1 ENUMERATED {supported} OPTIONAL,

 configuredUL-GrantType2 ENUMERATED {supported} OPTIONAL,

 pre-EmptIndication-DL ENUMERATED {supported} OPTIONAL,

 cbg-TransIndication-DL ENUMERATED {supported} OPTIONAL,

 cbg-TransIndication-UL ENUMERATED {supported} OPTIONAL,

 cbg-FlushIndication-DL ENUMERATED {supported} OPTIONAL,

 dynamicHARQ-ACK-CodeB-CBG-Retx-DL ENUMERATED {supported} OPTIONAL,

 rateMatchingResrcSetSemi-Static ENUMERATED {supported} OPTIONAL,

 rateMatchingResrcSetDynamic ENUMERATED {supported} OPTIONAL,

 bwp-SwitchingDelay ENUMERATED {type1, type2} OPTIONAL,

 ...,

 [[

 dummy ENUMERATED {supported} OPTIONAL

 ]],

 [[

 maxNumberSearchSpaces ENUMERATED {n10} OPTIONAL,

 rateMatchingCtrlResrcSetDynamic ENUMERATED {supported} OPTIONAL,

 maxLayersMIMO-Indication ENUMERATED {supported} OPTIONAL

 ]]

}

Phy-ParametersXDD-Diff ::= SEQUENCE {

 dynamicSFI ENUMERATED {supported} OPTIONAL,

 twoPUCCH-F0-2-ConsecSymbols ENUMERATED {supported} OPTIONAL,

 twoDifferentTPC-Loop-PUSCH ENUMERATED {supported} OPTIONAL,

 twoDifferentTPC-Loop-PUCCH ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 dl-SchedulingOffset-PDSCH-TypeA ENUMERATED {supported} OPTIONAL,

 dl-SchedulingOffset-PDSCH-TypeB ENUMERATED {supported} OPTIONAL,

 ul-SchedulingOffset ENUMERATED {supported} OPTIONAL

 ]]

}

Phy-ParametersFRX-Diff ::= SEQUENCE {

 dynamicSFI ENUMERATED {supported} OPTIONAL,

 dummy1 BIT STRING (SIZE (2)) OPTIONAL,

 twoFL-DMRS BIT STRING (SIZE (2)) OPTIONAL,

 dummy2 BIT STRING (SIZE (2)) OPTIONAL,

 dummy3 BIT STRING (SIZE (2)) OPTIONAL,

 supportedDMRS-TypeDL ENUMERATED {type1, type1And2} OPTIONAL,

 supportedDMRS-TypeUL ENUMERATED {type1, type1And2} OPTIONAL,

 semiOpenLoopCSI ENUMERATED {supported} OPTIONAL,

 csi-ReportWithoutPMI ENUMERATED {supported} OPTIONAL,

 csi-ReportWithoutCQI ENUMERATED {supported} OPTIONAL,

 onePortsPTRS BIT STRING (SIZE (2)) OPTIONAL,

 twoPUCCH-F0-2-ConsecSymbols ENUMERATED {supported} OPTIONAL,

 pucch-F2-WithFH ENUMERATED {supported} OPTIONAL,

 pucch-F3-WithFH ENUMERATED {supported} OPTIONAL,

 pucch-F4-WithFH ENUMERATED {supported} OPTIONAL,

 pucch-F0-2WithoutFH ENUMERATED {notSupported} OPTIONAL,

 pucch-F1-3-4WithoutFH ENUMERATED {notSupported} OPTIONAL,

 mux-SR-HARQ-ACK-CSI-PUCCH-MultiPerSlot ENUMERATED {supported} OPTIONAL,

 uci-CodeBlockSegmentation ENUMERATED {supported} OPTIONAL,

 onePUCCH-LongAndShortFormat ENUMERATED {supported} OPTIONAL,

 twoPUCCH-AnyOthersInSlot ENUMERATED {supported} OPTIONAL,

 intraSlotFreqHopping-PUSCH ENUMERATED {supported} OPTIONAL,

 pusch-LBRM ENUMERATED {supported} OPTIONAL,

 pdcch-BlindDetectionCA INTEGER (4..16) OPTIONAL,

 tpc-PUSCH-RNTI ENUMERATED {supported} OPTIONAL,

 tpc-PUCCH-RNTI ENUMERATED {supported} OPTIONAL,

 tpc-SRS-RNTI ENUMERATED {supported} OPTIONAL,

 absoluteTPC-Command ENUMERATED {supported} OPTIONAL,

 twoDifferentTPC-Loop-PUSCH ENUMERATED {supported} OPTIONAL,

 twoDifferentTPC-Loop-PUCCH ENUMERATED {supported} OPTIONAL,

 pusch-HalfPi-BPSK ENUMERATED {supported} OPTIONAL,

 pucch-F3-4-HalfPi-BPSK ENUMERATED {supported} OPTIONAL,

 almostContiguousCP-OFDM-UL ENUMERATED {supported} OPTIONAL,

 sp-CSI-RS ENUMERATED {supported} OPTIONAL,

 sp-CSI-IM ENUMERATED {supported} OPTIONAL,

 tdd-MultiDL-UL-SwitchPerSlot ENUMERATED {supported} OPTIONAL,

 multipleCORESET ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 csi-RS-IM-ReceptionForFeedback CSI-RS-IM-ReceptionForFeedback OPTIONAL,

 csi-RS-ProcFrameworkForSRS CSI-RS-ProcFrameworkForSRS OPTIONAL,

 csi-ReportFramework CSI-ReportFramework OPTIONAL,

 mux-SR-HARQ-ACK-CSI-PUCCH-OncePerSlot SEQUENCE {

 sameSymbol ENUMERATED {supported} OPTIONAL,

 diffSymbol ENUMERATED {supported} OPTIONAL

 } OPTIONAL,

 mux-SR-HARQ-ACK-PUCCH ENUMERATED {supported} OPTIONAL,

 mux-MultipleGroupCtrlCH-Overlap ENUMERATED {supported} OPTIONAL,

 dl-SchedulingOffset-PDSCH-TypeA ENUMERATED {supported} OPTIONAL,

 dl-SchedulingOffset-PDSCH-TypeB ENUMERATED {supported} OPTIONAL,

 ul-SchedulingOffset ENUMERATED {supported} OPTIONAL,

 dl-64QAM-MCS-TableAlt ENUMERATED {supported} OPTIONAL,

 ul-64QAM-MCS-TableAlt ENUMERATED {supported} OPTIONAL,

 cqi-TableAlt ENUMERATED {supported} OPTIONAL,

 oneFL-DMRS-TwoAdditionalDMRS-UL ENUMERATED {supported} OPTIONAL,

 twoFL-DMRS-TwoAdditionalDMRS-UL ENUMERATED {supported} OPTIONAL,

 oneFL-DMRS-ThreeAdditionalDMRS-UL ENUMERATED {supported} OPTIONAL

 ]],

 [[

 pdcch-BlindDetectionNRDC SEQUENCE {

 pdcch-BlindDetectionMCG-UE INTEGER (1..15),

 pdcch-BlindDetectionSCG-UE INTEGER (1..15)

 } OPTIONAL,

 mux-HARQ-ACK-PUSCH-DiffSymbol ENUMERATED {supported} OPTIONAL

 ]]

}

Phy-ParametersFR1 ::= SEQUENCE {

 pdcch-MonitoringSingleOccasion ENUMERATED {supported} OPTIONAL,

 scs-60kHz ENUMERATED {supported} OPTIONAL,

 pdsch-256QAM-FR1 ENUMERATED {supported} OPTIONAL,

 pdsch-RE-MappingFR1-PerSymbol ENUMERATED {n10, n20} OPTIONAL,

 ...,

 [[

 pdsch-RE-MappingFR1-PerSlot ENUMERATED {n16, n32, n48, n64, n80, n96, n112, n128,

 n144, n160, n176, n192, n208, n224, n240, n256} OPTIONAL

 ]]

}

Phy-ParametersFR2 ::= SEQUENCE {

 dummy ENUMERATED {supported} OPTIONAL,

 pdsch-RE-MappingFR2-PerSymbol ENUMERATED {n6, n20} OPTIONAL,

 ...,

 [[

 pCell-FR2 ENUMERATED {supported} OPTIONAL,

 pdsch-RE-MappingFR2-PerSlot ENUMERATED {n16, n32, n48, n64, n80, n96, n112, n128,

 n144, n160, n176, n192, n208, n224, n240, n256} OPTIONAL

 ]]

}

-- TAG-PHY-PARAMETERS-STOP

-- ASN1STOP

|  |
| --- |
| *Phy-ParametersFRX-Diff field description* |
| ***csi-RS-IM-ReceptionForFeedback/ csi-RS-ProcFrameworkForSRS/ csi-ReportFramework***These fields are optionally present in *fr1-fr2-Add-UE-NR-Capabilities* in *UE-NR-Capability*. For a band combination comprised of FR1 and FR2 bands, these parameters, if present, limit the corresponding parameters in *MIMO-ParametersPerBand*. |

#### – *Phy-ParametersMRDC*

The IE *Phy-ParametersMRDC* is used to convey physical layer capabilities for MR-DC.

*Phy-ParametersMRDC* information element

-- ASN1START

-- TAG-PHY-PARAMETERSMRDC-START

Phy-ParametersMRDC ::= SEQUENCE {

 naics-Capability-List SEQUENCE (SIZE (1..maxNrofNAICS-Entries)) OF NAICS-Capability-Entry OPTIONAL,

 ...

}

NAICS-Capability-Entry ::= SEQUENCE {

 numberOfNAICS-CapableCC INTEGER(1..5),

 numberOfAggregatedPRB ENUMERATED {n50, n75, n100, n125, n150, n175, n200, n225,

 n250, n275, n300, n350, n400, n450, n500, spare},

 ...

}

-- TAG-PHY-PARAMETERSMRDC-STOP

-- ASN1STOP

|  |
| --- |
| *PHY-ParametersMRDC* field descriptions |
| ***naics-Capability-List***Indicates that UE in MR-DC supports NAICS as defined in defined in TS 36.331 [10]. |

#### – *ProcessingParameters*

The IE *ProcessingParameters* is used to indicate PDSCH/PUSCH processing capabilities supported by the UE.

*ProcessingParameters* information element

-- ASN1START

-- TAG-PROCESSINGPARAMETERS-START

ProcessingParameters ::= SEQUENCE {

 fallback ENUMERATED {sc, cap1-only},

 differentTB-PerSlot SEQUENCE {

 upto1 NumberOfCarriers OPTIONAL,

 upto2 NumberOfCarriers OPTIONAL,

 upto4 NumberOfCarriers OPTIONAL,

 upto7 NumberOfCarriers OPTIONAL

 } OPTIONAL

}

NumberOfCarriers ::= INTEGER (1..16)

-- TAG-PROCESSINGPARAMETERS-STOP

-- ASN1STOP

#### – *RAT-Type*

The IE *RAT-Type* is used to indicate the radio access technology (RAT), including NR, of the requested/transferred UE capabilities.

*RAT-Type* information element

-- ASN1START

-- TAG-RAT-TYPE-START

RAT-Type ::= ENUMERATED {nr, eutra-nr, eutra, spare1, ...}

-- TAG-RAT-TYPE-STOP

-- ASN1STOP

#### – *RF-Parameters*

The IE *RF-Parameters* is used to convey RF-related capabilities for NR operation.

*RF-Parameters* information element

-- ASN1START

-- TAG-RF-PARAMETERS-START

RF-Parameters ::= SEQUENCE {

 supportedBandListNR SEQUENCE (SIZE (1..maxBands)) OF BandNR,

 supportedBandCombinationList BandCombinationList OPTIONAL,

 appliedFreqBandListFilter FreqBandList OPTIONAL,

 ...,

 [[

 supportedBandCombinationList-v1540 BandCombinationList-v1540 OPTIONAL,

 srs-SwitchingTimeRequested ENUMERATED {true} OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1550 BandCombinationList-v1550 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1560 BandCombinationList-v1560 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v16x0 BandCombinationList-v16x0 OPTIONAL

 ]]

}

BandNR ::= SEQUENCE {

 bandNR FreqBandIndicatorNR,

 modifiedMPR-Behaviour BIT STRING (SIZE (8)) OPTIONAL,

 mimo-ParametersPerBand MIMO-ParametersPerBand OPTIONAL,

 extendedCP ENUMERATED {supported} OPTIONAL,

 multipleTCI ENUMERATED {supported} OPTIONAL,

 bwp-WithoutRestriction ENUMERATED {supported} OPTIONAL,

 bwp-SameNumerology ENUMERATED {upto2, upto4} OPTIONAL,

 bwp-DiffNumerology ENUMERATED {upto4} OPTIONAL,

 crossCarrierScheduling-SameSCS ENUMERATED {supported} OPTIONAL,

 pdsch-256QAM-FR2 ENUMERATED {supported} OPTIONAL,

 pusch-256QAM ENUMERATED {supported} OPTIONAL,

 ue-PowerClass ENUMERATED {pc1, pc2, pc3, pc4} OPTIONAL,

 rateMatchingLTE-CRS ENUMERATED {supported} OPTIONAL,

 channelBWs-DL-v1530 CHOICE {

 fr1 SEQUENCE {

 scs-15kHz BIT STRING (SIZE (10)) OPTIONAL,

 scs-30kHz BIT STRING (SIZE (10)) OPTIONAL,

 scs-60kHz BIT STRING (SIZE (10)) OPTIONAL

 },

 fr2 SEQUENCE {

 scs-60kHz BIT STRING (SIZE (3)) OPTIONAL,

 scs-120kHz BIT STRING (SIZE (3)) OPTIONAL

 }

 } OPTIONAL,

 channelBWs-UL-v1530 CHOICE {

 fr1 SEQUENCE {

 scs-15kHz BIT STRING (SIZE (10)) OPTIONAL,

 scs-30kHz BIT STRING (SIZE (10)) OPTIONAL,

 scs-60kHz BIT STRING (SIZE (10)) OPTIONAL

 },

 fr2 SEQUENCE {

 scs-60kHz BIT STRING (SIZE (3)) OPTIONAL,

 scs-120kHz BIT STRING (SIZE (3)) OPTIONAL

 }

 } OPTIONAL,

 ...,

 [[

 maxUplinkDutyCycle-PC2-FR1 ENUMERATED {n60, n70, n80, n90, n100} OPTIONAL

 ]],

 [[

 pucch-SpatialRelInfoMAC-CE ENUMERATED {supported} OPTIONAL,

 powerBoosting-pi2BPSK ENUMERATED {supported} OPTIONAL

 ]],

 [[

 maxUplinkDutyCycle-FR2 ENUMERATED {n15, n20, n25, n30, n40, n50, n60, n70, n80, n90, n100} OPTIONAL

 ]]

}

-- TAG-RF-PARAMETERS-STOP

-- ASN1STOP

|  |
| --- |
| *RF-Parameters* field descriptions |
| ***appliedFreqBandListFilter***In this field the UE mirrors the *FreqBandList* that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the *supportedBandCombinationList* in accordance with this *appliedFreqBandListFilter*. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10]. |
| ***supportedBandCombinationList***A list of band combinations that the UE supports for NR (without MR-DC). The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-NR-Capability* IE. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10]. |

#### – *RF-ParametersMRDC*

The IE *RF-ParametersMRDC* is used to convey RF related capabilities for MR-DC.

*RF-ParametersMRDC* information element

-- ASN1START

-- TAG-RF-PARAMETERSMRDC-START

RF-ParametersMRDC ::= SEQUENCE {

 supportedBandCombinationList BandCombinationList OPTIONAL,

 appliedFreqBandListFilter FreqBandList OPTIONAL,

 ...,

 [[

 srs-SwitchingTimeRequested ENUMERATED {true} OPTIONAL,

 supportedBandCombinationList-v1540 BandCombinationList-v1540 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1550 BandCombinationList-v1550 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1560 BandCombinationList-v1560 OPTIONAL,

 supportedBandCombinationListNEDC-Only BandCombinationList OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1570 BandCombinationList-v1570 OPTIONAL

 ]]

}

-- TAG-RF-PARAMETERSMRDC-STOP

-- ASN1STOP

|  |
| --- |
| *RF-ParametersMRDC* field descriptions |
| ***appliedFreqBandListFilter***In this field the UE mirrors the *FreqBandList* that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the *supportedBandCombinationList* in accordance with this *appliedFreqBandListFilter*. |
| ***supportedBandCombinationList***A list of band combinations that the UE supports for MR-DC. The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-MRDC-Capability* IE. |
| ***supportedBandCombinationListNEDC-Only***A list of band combinations that the UE supports only for NE-DC. The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-MRDC-Capability* IE. |

#### – *RLC-Parameters*

The IE *RLC-Parameters* is used to convey capabilities related to RLC.

*RLC-Parameters* information element

-- ASN1START

-- TAG-RLC-PARAMETERS-START

RLC-Parameters ::= SEQUENCE {

 am-WithShortSN ENUMERATED {supported} OPTIONAL,

 um-WithShortSN ENUMERATED {supported} OPTIONAL,

 um-WithLongSN ENUMERATED {supported} OPTIONAL,

 ...

}

-- TAG-RLC-PARAMETERS-STOP

-- ASN1STOP

#### – *SDAP-Parameters*

The IE *SDAP-Parameters* is used to convey capabilities related to SDAP.

*SDAP-Parameters* information element

-- ASN1START

-- TAG-SDAP-PARAMETERS-START

SDAP-Parameters ::= SEQUENCE {

 as-ReflectiveQoS ENUMERATED {true} OPTIONAL,

 ...

}

-- TAG-SDAP-PARAMETERS-STOP

-- ASN1STOP

#### – *SRS-SwitchingTimeNR*

The IE *SRS-SwitchingTimeNR* is used to indicate the SRS carrier switching time supported by the UE for one NR band pair.

*SRS-SwitchingTimeNR information element*

-- ASN1START

-- TAG-SRS-SWITCHINGTIMENR-START

SRS-SwitchingTimeNR ::= SEQUENCE {

 switchingTimeDL ENUMERATED {n0us, n30us, n100us, n140us, n200us, n300us, n500us, n900us} OPTIONAL,

 switchingTimeUL ENUMERATED {n0us, n30us, n100us, n140us, n200us, n300us, n500us, n900us} OPTIONAL

}

-- TAG-SRS-SWITCHINGTIMENR-STOP

-- ASN1STOP

#### – *SRS-SwitchingTimeEUTRA*

The IE *SRS-SwitchingTimeEUTRA* is used to indicate the SRS carrier switching time supported by the UE for one E-UTRA band pair.

*SRS-SwitchingTimeEUTRA information element*

-- ASN1START

-- TAG-SRS-SWITCHINGTIMEEUTRA-START

SRS-SwitchingTimeEUTRA ::= SEQUENCE {

 switchingTimeDL ENUMERATED {n0, n0dot5, n1, n1dot5, n2, n2dot5, n3, n3dot5, n4, n4dot5, n5, n5dot5, n6, n6dot5, n7}

 OPTIONAL,

 switchingTimeUL ENUMERATED {n0, n0dot5, n1, n1dot5, n2, n2dot5, n3, n3dot5, n4, n4dot5, n5, n5dot5, n6, n6dot5, n7}

 OPTIONAL

}

-- TAG-SRS-SWITCHINGTIMEEUTRA-STOP

-- ASN1STOP

#### – *SupportedBandwidth*

The IE *SupportedBandwidth* is used to indicate the maximum channel bandwidth supported by the UE on one carrier of a band of a band combination.

*SupportedBandwidth* information element

-- ASN1START

-- TAG-SUPPORTEDBANDWIDTH-START

SupportedBandwidth ::= CHOICE {

 fr1 ENUMERATED {mhz5, mhz10, mhz15, mhz20, mhz25, mhz30, mhz40, mhz50, mhz60, mhz80, mhz100},

 fr2 ENUMERATED {mhz50, mhz100, mhz200, mhz400}

}

-- TAG-SUPPORTEDBANDWIDTH-STOP

-- ASN1STOP

#### – *UE-CapabilityRAT-ContainerList*

The IE *UE-CapabilityRAT-ContainerList* contains a list of radio access technology specific capability containers.

*UE-CapabilityRAT-ContainerList* information element

-- ASN1START

-- TAG-UE-CAPABILITYRAT-CONTAINERLIST-START

UE-CapabilityRAT-ContainerList ::= SEQUENCE (SIZE (0..maxRAT-CapabilityContainers)) OF UE-CapabilityRAT-Container

UE-CapabilityRAT-Container ::= SEQUENCE {

 rat-Type RAT-Type,

 ue-CapabilityRAT-Container OCTET STRING

}

-- TAG-UE-CAPABILITYRAT-CONTAINERLIST-STOP

-- ASN1STOP

|  |
| --- |
| *UE-CapabilityRAT-ContainerList* field descriptions |
| ***ue-CapabilityRAT-Container***Container for the UE capabilities of the indicated RAT. The encoding is defined in the specification of each RAT:For *rat-Type* set to *nr*: the encoding of UE capabilities is defined in *UE-NR-Capability*.For *rat-Type* set to *eutra-nr*: the encoding of UE capabilities is defined in *UE-MRDC-Capability*.For *rat-Type* set to *eutra*: the encoding of UE capabilities is defined in *UE-EUTRA-Capability* specified in TS 36.331 [10]. |

#### – *UE-CapabilityRAT-RequestList*

The IE *UE-CapabilityRAT-RequestList* is used to request UE capabilities for one or more RATs from the UE.

*UE-CapabilityRAT-RequestList* information element

-- ASN1START

-- TAG-UE-CAPABILITYRAT-REQUESTLIST-START

UE-CapabilityRAT-RequestList ::= SEQUENCE (SIZE (1..maxRAT-CapabilityContainers)) OF UE-CapabilityRAT-Request

UE-CapabilityRAT-Request ::= SEQUENCE {

 rat-Type RAT-Type,

 capabilityRequestFilter OCTET STRING OPTIONAL, -- Need N

 ...

}

-- TAG-UE-CAPABILITYRAT-REQUESTLIST-STOP

-- ASN1STOP

|  |
| --- |
| *UE-CapabilityRAT-Request* field descriptions |
| ***capabilityRequestFilter***Information by which the network requests the UE to filter the UE capabilities.For *rat-Type* set to *nr* or *eutra-nr*: the encoding of the *capabilityRequestFilter* is defined in *UE-CapabilityRequestFilterNR*.For *rat-Type* set to *eutra*: the encoding of the *capabilityRequestFilter* is defined by *UECapabilityEnquiry* message defined in TS36.331 [10], in which *RAT-Type* in *UE-CapabilityRequest* includes only '*eutra'*. |
| ***rat-Type***The RAT type for which the NW requests UE capabilities. |

#### – *UE-CapabilityRequestFilterCommon*

The IE *UE-CapabilityRequestFilterCommon* is used to request filtered UE capabilities. The filter is common for all capability containers that are requested.

*UE-CapabilityRequestFilterCommon* information element

-- ASN1START

-- TAG-UE-CAPABILITYREQUESTFILTERCOMMON-START

UE-CapabilityRequestFilterCommon ::= SEQUENCE {

 mrdc-Request SEQUENCE {

 omitEN-DC ENUMERATED {true} OPTIONAL, -- Need N

 includeNR-DC ENUMERATED {true} OPTIONAL, -- Need N

 includeNE-DC ENUMERATED {true} OPTIONAL -- Need N

 } OPTIONAL, -- Need N

 ...

}

-- TAG-UE-CAPABILITYREQUESTFILTERCOMMON-STOP

-- ASN1STOP

|  |
| --- |
| *UE-CapabilityRequestFilterCommon field descriptions* |
| ***includeNE-DC***Only if this field is present, the UE supporting NE-DC shall indicate support for NE-DC in band combinations and include feature set combinations which are applicable to NE-DC. Band combinations supporting both NE-DC and (NG)EN-DC shall be included in *supportedBandCombinationList*, band combinations supporting only NE-DC shall be included in *supportedBandCombinationListNEDC-Only*. |
| ***includeNR-DC***Only if this field is present, the UE supporting NR-DC shall indicate support for NR-DC in band combinations and include feature set combinations which are applicable to NR-DC. |
| ***omitEN-DC***Only if this field is present, the UE shall omit band combinations and feature set combinations which are only applicable to EN-DC. |

#### – *UE-CapabilityRequestFilterNR*

The IE *UE-CapabilityRequestFilterNR* is used to request filtered UE capabilities.

*UE-CapabilityRequestFilterNR* information element

-- ASN1START

-- TAG-UE-CAPABILITYREQUESTFILTERNR-START

UE-CapabilityRequestFilterNR ::= SEQUENCE {

 frequencyBandListFilter FreqBandList OPTIONAL, -- Need N

 nonCriticalExtension UE-CapabilityRequestFilterNR-v1540 OPTIONAL

}

UE-CapabilityRequestFilterNR-v1540 ::= SEQUENCE {

 srs-SwitchingTimeRequest ENUMERATED {true} OPTIONAL, -- Need N

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- TAG-UE-CAPABILITYREQUESTFILTERNR-STOP

-- ASN1STOP

#### – *UE-MRDC-Capability*

The IE *UE-MRDC-Capability* is used to convey the UE Radio Access Capability Parameters for MR-DC, see TS 38.306 [26].

*UE-MRDC-Capability* information element

-- ASN1START

-- TAG-UE-MRDC-CAPABILITY-START

UE-MRDC-Capability ::= SEQUENCE {

 measAndMobParametersMRDC MeasAndMobParametersMRDC OPTIONAL,

 phy-ParametersMRDC-v1530 Phy-ParametersMRDC OPTIONAL,

 rf-ParametersMRDC RF-ParametersMRDC,

 generalParametersMRDC GeneralParametersMRDC-XDD-Diff OPTIONAL,

 fdd-Add-UE-MRDC-Capabilities UE-MRDC-CapabilityAddXDD-Mode OPTIONAL,

 tdd-Add-UE-MRDC-Capabilities UE-MRDC-CapabilityAddXDD-Mode OPTIONAL,

 fr1-Add-UE-MRDC-Capabilities UE-MRDC-CapabilityAddFRX-Mode OPTIONAL,

 fr2-Add-UE-MRDC-Capabilities UE-MRDC-CapabilityAddFRX-Mode OPTIONAL,

 featureSetCombinations SEQUENCE (SIZE (1..maxFeatureSetCombinations)) OF FeatureSetCombination OPTIONAL,

 pdcp-ParametersMRDC-v1530 PDCP-ParametersMRDC OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension UE-MRDC-Capability-v1560 OPTIONAL

}

UE-MRDC-Capability-v1560 ::= SEQUENCE {

 receivedFilters OCTET STRING (CONTAINING UECapabilityEnquiry-v1560-IEs) OPTIONAL,

 measAndMobParametersMRDC-v1560 MeasAndMobParametersMRDC-v1560 OPTIONAL,

 fdd-Add-UE-MRDC-Capabilities-v1560 UE-MRDC-CapabilityAddXDD-Mode-v1560 OPTIONAL,

 tdd-Add-UE-MRDC-Capabilities-v1560 UE-MRDC-CapabilityAddXDD-Mode-v1560 OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

UE-MRDC-CapabilityAddXDD-Mode ::= SEQUENCE {

 measAndMobParametersMRDC-XDD-Diff MeasAndMobParametersMRDC-XDD-Diff OPTIONAL,

 generalParametersMRDC-XDD-Diff GeneralParametersMRDC-XDD-Diff OPTIONAL

}

UE-MRDC-CapabilityAddXDD-Mode-v1560 ::= SEQUENCE {

 measAndMobParametersMRDC-XDD-Diff-v1560 MeasAndMobParametersMRDC-XDD-Diff-v1560 OPTIONAL

}

UE-MRDC-CapabilityAddFRX-Mode ::= SEQUENCE {

 measAndMobParametersMRDC-FRX-Diff MeasAndMobParametersMRDC-FRX-Diff

}

GeneralParametersMRDC-XDD-Diff ::= SEQUENCE {

 splitSRB-WithOneUL-Path ENUMERATED {supported}  OPTIONAL,

 splitDRB-withUL-Both-MCG-SCG ENUMERATED {supported} OPTIONAL,

 srb3 ENUMERATED {supported} OPTIONAL,

 v2x-EUTRA ENUMERATED {supported} OPTIONAL,

 ...

}

-- TAG-UE-MRDC-CAPABILITY-STOP

-- ASN1STOP

|  |
| --- |
| *UE-MRDC-Capability* field descriptions |
| ***featureSetCombinations***A list of *FeatureSetCombination*:s for MR-DC. The *FeatureSetDownlink*:s and *FeatureSetUplink*:s referred to from these *FeatureSetCombination*:s are defined in the *featureSets* list in *UE-NR-Capability*. |

#### – *UE-NR-Capability*

The IE *UE-NR-Capability* is used to convey the NR UE Radio Access Capability Parameters, see TS 38.306 [26].

*UE-NR-Capability* information element

-- ASN1START

-- TAG-UE-NR-CAPABILITY-START

UE-NR-Capability ::= SEQUENCE {

 accessStratumRelease AccessStratumRelease,

 pdcp-Parameters PDCP-Parameters,

 rlc-Parameters RLC-Parameters OPTIONAL,

 mac-Parameters MAC-Parameters OPTIONAL,

 phy-Parameters Phy-Parameters,

 rf-Parameters RF-Parameters,

 measAndMobParameters MeasAndMobParameters OPTIONAL,

 fdd-Add-UE-NR-Capabilities UE-NR-CapabilityAddXDD-Mode OPTIONAL,

 tdd-Add-UE-NR-Capabilities UE-NR-CapabilityAddXDD-Mode OPTIONAL,

 fr1-Add-UE-NR-Capabilities UE-NR-CapabilityAddFRX-Mode OPTIONAL,

 fr2-Add-UE-NR-Capabilities UE-NR-CapabilityAddFRX-Mode OPTIONAL,

 featureSets FeatureSets OPTIONAL,

 featureSetCombinations SEQUENCE (SIZE (1..maxFeatureSetCombinations)) OF FeatureSetCombination OPTIONAL,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 nonCriticalExtension UE-NR-Capability-v1530 OPTIONAL

}

UE-NR-Capability-v1530 ::= SEQUENCE {

 fdd-Add-UE-NR-Capabilities-v1530 UE-NR-CapabilityAddXDD-Mode-v1530 OPTIONAL,

 tdd-Add-UE-NR-Capabilities-v1530 UE-NR-CapabilityAddXDD-Mode-v1530 OPTIONAL,

 dummy ENUMERATED {supported} OPTIONAL,

 interRAT-Parameters InterRAT-Parameters OPTIONAL,

 inactiveState ENUMERATED {supported} OPTIONAL,

 delayBudgetReporting ENUMERATED {supported} OPTIONAL,

 nonCriticalExtension UE-NR-Capability-v1540 OPTIONAL

}

UE-NR-Capability-v1540 ::= SEQUENCE {

 sdap-Parameters SDAP-Parameters OPTIONAL,

 overheatingInd ENUMERATED {supported} OPTIONAL,

 ims-Parameters IMS-Parameters OPTIONAL,

 fr1-Add-UE-NR-Capabilities-v1540 UE-NR-CapabilityAddFRX-Mode-v1540 OPTIONAL,

 fr2-Add-UE-NR-Capabilities-v1540 UE-NR-CapabilityAddFRX-Mode-v1540 OPTIONAL,

 fr1-fr2-Add-UE-NR-Capabilities UE-NR-CapabilityAddFRX-Mode OPTIONAL,

 nonCriticalExtension UE-NR-Capability-v1550 OPTIONAL

}

UE-NR-Capability-v1550 ::= SEQUENCE {

 reducedCP-Latency ENUMERATED {supported} OPTIONAL,

 nonCriticalExtension UE-NR-Capability-v1560 OPTIONAL

}

UE-NR-Capability-v1560 ::= SEQUENCE {

 nrdc-Parameters NRDC-Parameters OPTIONAL,

 receivedFilters OCTET STRING (CONTAINING UECapabilityEnquiry-v1560-IEs) OPTIONAL,

 nonCriticalExtension UE-NR-Capability-v1570 OPTIONAL

}

UE-NR-Capability-v1570 ::= SEQUENCE {

 nrdc-Parameters-v1570 NRDC-Parameters-v1570 OPTIONAL,

 nonCriticalExtension SEQUENCE {} OPTIONAL

}

UE-NR-CapabilityAddXDD-Mode ::= SEQUENCE {

 phy-ParametersXDD-Diff Phy-ParametersXDD-Diff OPTIONAL,

 mac-ParametersXDD-Diff MAC-ParametersXDD-Diff OPTIONAL,

 measAndMobParametersXDD-Diff MeasAndMobParametersXDD-Diff OPTIONAL

}

UE-NR-CapabilityAddXDD-Mode-v1530 ::= SEQUENCE {

 eutra-ParametersXDD-Diff EUTRA-ParametersXDD-Diff

}

UE-NR-CapabilityAddFRX-Mode ::= SEQUENCE {

 phy-ParametersFRX-Diff Phy-ParametersFRX-Diff OPTIONAL,

 measAndMobParametersFRX-Diff MeasAndMobParametersFRX-Diff OPTIONAL

}

UE-NR-CapabilityAddFRX-Mode-v1540 ::= SEQUENCE {

 ims-ParametersFRX-Diff IMS-ParametersFRX-Diff OPTIONAL

}

-- TAG-UE-NR-CAPABILITY-STOP

-- ASN1STOP

|  |
| --- |
| *UE-NR-Capability* field descriptions |
| ***featureSetCombinations***A list of *FeatureSetCombination:s* for NR (not for MR-DC). The *FeatureSetDownlink:s* and *FeatureSetUplink:s* referred to from these *FeatureSetCombination:s* are defined in the *featureSets* list in *UE-NR-Capability*. |