**3GPP T****SG-RAN WG4 Meeting #97-e R4-2017150**

Electronic Meeting, 2 – 13 November, 2020

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.133** | **CR** | **1362** | **rev** | **1** | **Current version:** | **16.5.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | Refinements on CSSF within gap to include NR positioning measurements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos-Core | | | | |  | ***Date:*** | | | 22/10/2020 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | CR 0941 was agreed at RAN4 #96-e in R4-2012286 on the matter of gap sharing between RRM and NR positioning measurements. This contained open issues such as how to define long-periodicicity NR measurements for positioning, which do not enter the gap competition, for PRS periodicities ≤160 ms and left the NR measurement term open. | | | | | | | | |
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| ***Summary of change:*** | | In sub-clauses 9.1.5, 9.1.5.2, 9.1.5.2.5 to 9.1.5.2.7, the term “NR PRS measurements for positioning” is used to cover NR PRS measurements.  It is noted that there is no unique term used in the specifications (TS 36.306: PRS measurement; TS 37.355: DL-PRS measurement, DL PRS measurement; TS 38.331: positioning measurement towards NR).  Applicability of CSSFwithin\_gap,i=1, i.e. long-periodicity NR measurements for positioning, related to PRS periodicities ≤160 ms is fixed taking into account muting patterns, i.e. effective PRS periodicity of 320 ms or larger defines a long-periodicity NR measurement.  The condition when a NR PRS measurement for positioning is a candidate to be measured in a gap is added.  It is defined that NR PRS measurements for positioning in a [single] positioning frequency layer are candidates for  Sub-clauses 9.1.5.2.5 to 9.1.5.2.7 for PRS measurements point to sub-clauses 9.1.5.2.2 to 9.1.5.2.4 related to CSSF sharing rules within measurement gaps. | | | | | | | | |
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| ***Consequences if not approved:*** | | NR positioning measurement requirements are incomplete. | | | | | | | | |
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| ***Clauses affected:*** | | 9.1.5.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | None. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Revision of R4-2016156. | | | | | | | | |

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| **Start of Change 1** |

### 9.1.5 Carrier-specific scaling factor

This clause specifies the derivation of carrier-specific scaling factor (CSSF) values, which scales the measurement delay requirements given in clause 9.2, 9.3, 9.4, and NR PRS measurements for positioning in clause 9.9 when UE is configured to monitor multiple measurement objects. The CSSF values are categorized into CSSFoutside\_gap,i andCSSFwithin\_gap,i, for the measurements conducted outside measurement gaps and within measurement gaps, respectively.

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| **End of Change 1 - Begin of Change 2** |

#### 9.1.5.2 Monitoring of multiple layers within gaps

The carrier-specific scaling factor CSSFwithin\_gap,i for a measurement object *i* derived in this chapter is applied to following measurement types:

- Intra-frequency measurement object with no measurement gap in clause 9.2.5, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

- Intra-frequency measurement object with measurement gap in clause 9.2.6.

- Inter-frequency measurement with no measurement gap in clause 9.3.9, when all of the SMTC occasions of this inter-frequency measurement object are overlapped by the measurement gap, if UE supports *interFrequencyMeas-NoGap-r16*.

- Inter-frequency measurement object with measurement gap in clause 9.3.4.

- E-UTRA Inter-RAT measurement object in clauses 9.4.2 and 9.4.3.

- NR PRS measurements for positioning in clause 9.9.

- E-UTRA Inter-RAT RSTD and E-CID measurements in clauses 9.4.4 and 9.4.5.

- NR Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4).

- E-UTRAN Inter-frequency measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.3) and by the E-UTRAN PSCell (TS 36.133 [15] clause 8.19.3).

- E-UTRAN Inter-frequency RSTD measurement configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.15).

- UTRA Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.5 to 8.17.12).

- GSM Inter-RAT measurements configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.13 and 8.17.14).

UE is expected to conduct the measurement of this measurement object *i* only within the measurement gaps.

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSFwithin\_gap,i and requirements derived from CSSFoutside\_gap,i are not specified.

##### 9.1.5.2.1 EN-DC mode: carrier-specific scaling factor for SSB-based measurements performed within gaps

The scaling value CSSFwithin\_gap,i below has been derived without considering GSM inter-RAT carriers.

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index *i* is designated as CSSFwithin\_gap,i and is derived as described in this clause.

If measurement object *i* refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured, CSSFwithin\_gap,i=1. Otherwise, the CSSFwithin\_gap,i for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap *j* not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 160ms period, count the total number of intra-frequency measurement objects and inter-frequency/inter-RAT measurement objects which are candidates to be measured within the gap *j*.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR carriers, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

- An inter-RAT UTRA measurement object configured by E-UTRA PCell [15] is a candidate to be measured in all measurement gaps.

- An inter-frequency E-UTRA measurement object configured by E-UTRA PCell [15] is a candidate to be measured in all measurement gaps.

- For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.

- Mintra,i,j: Number of intra-frequency measurement objects which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise Mintra,i,j equals 0.

- Minter,i,j : Number of NR inter-frequency measurement objects or NR inter-RAT measurement objects configured by E-UTRA PCell, EUTRA inter-frequency measurement objects configured by E-UTRA PCell, UTRA inter-RAT measurement objects configured by E-UTRA PCell which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise Minter,i,j equals 0.

- Mtot,i,j = Mintra,i,j + Minter,i,j : Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise Mtot,i,j equals 0.

For each measurement gap *j* used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 160ms period, Mintra,i,j = Minter,i,j = Mtot,i,j =0.

The carrier specific scaling factor CSSFwithin\_gap,i is given by:

If *measGapSharingScheme* is equal sharing, CSSFwithin\_gap,i= max(ceil(Ri×Mtot,i,j)), where *j*=0…(160/MGRP)-1

If *measGapSharingScheme* is not equal sharing and

- measurement object *i* is an intra-frequency measurement object, CSSFwithin\_gap,i is the maximum among

- ceil(Ri×Kintra×Mintra,i,j) in gaps where Minter,i,j≠0, where *j*=0…(160/MGRP)-1

- ceil(Ri×Mintra,i,j) in gaps where Minter,i,j=0, where *j*=0…(160/MGRP)-1

- measurement object *i* is an inter-frequency or inter-RAT measurement object, CSSFwithin\_gap,i is the maximum among

- ceil(Ri×Kinter×Minter,i,j) in gaps where Mintra,i,j ≠0, where *j*=0…(160/MGRP)-1

- ceil(Ri×Minter,i,j)in gaps where Mintra,i,j=0, where *j*=0…(160/MGRP)-1

Where Ri is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

##### 9.1.5.2.2 SA mode: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index *i* is designated as CSSFwithin\_gap,i and is derived as described in this clause.

If measurement object *i* refers to a long-periodicity measurement which is any of:

- an E-UTRA RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured, or

- an NR PRS measurement for positioning based on PRS configurations in Table 9.1.5.2.2-1

then CSSFwithin\_gap,i=1. Otherwise, the CSSFwithin\_gap,i for other measurement objects (including E-UTRA RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the CSSFwithin\_gap,i are derived as below.

Table 9.1.5.2.2-1: PRS configurations for long-periodicity NR measurements for positioning

|  |  |
| --- | --- |
| DL-PRS periodicity (ms) | DL-PRS-MutingPattern configuration |
| 320, 640, … ,10240 | With or without muting |
| 160 | With muting: size of MutingPattern ≥ 2 |
| 80 | With muting: size of MutingPattern ≥ 4 |
| 40 | With muting: size of MutingPattern ≥ 8 |
| NOTE: This applies for DL-PRS-MutingOption 1 and DL-PRS-Muting Option 2. | |

For each measurement gap *j* not used for a long-periodicity measurement defined above, count the total number of intra-frequency measurement objects and inter-frequency/inter-RAT measurement objects and NR PRS measurements for positioning in a [single] positioning frequency layer which are candidates to be measured within the gap *j*.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

- An inter-RAT measurement object is a candidate to be measured in all meausrement gaps.

- An inter-frequency SFTD measurement object, if to be measured with measurement gaps, is a candidate to be measured in all measurement gaps.

- An NR PRS measurement for positioning is a candidate to be measured in a gap if at least one PRS symbol is covered by the MGL excluding RF swtiching time.

- For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis. For UEs which support and are configured with per FR gaps, the CSSF requirements do not apply when NR PRS measurement in one FR gap collides with SSB/CSI-RS/PRS measurements in the other FR gap in time domain.

- Mintra,i,j: Number of intra-frequency measurement objects which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise Mintra,i,j equals 0.

- Minter,i,j : Number of NR inter-frequency, EUTRA inter-RAT and UTRA inter-RAT objects and NR PRS measurements for positioning in a [single] positioning frequency layer which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise Minter,i,j equals 0.

- Mtot,i,j = Mintra,i,j + Minter,i,j : Total number of intra-frequency, inter-frequency and inter-RAT measurement objects and NR PRS measurements for positioning in a [single] positioning frequency layer which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise Mtot,i,j equals 0.

For each measurement gap *j* used for a long-periodicity measurement defined above, Mintra,i,j = Minter,i,j = Mtot,i,j =0.

The carrier specific scaling factor CSSFwithin\_gap,i is given by:

If *measGapSharingScheme* is equal sharing, CSSFwithin\_gap,i= max(ceil(Ri×Mtot,i,j)), where *j*=0…(160/MGRP)-1

If *measGapSharingScheme* is not equal sharing and

- measurement object *i* is an intra-frequency measurement object, CSSFwithin\_gap,i is the maximum among

- ceil(Ri×Kintra×Mintra,i,j) in gaps where Minter,i,j≠0, where *j*=0…(160/MGRP)-1

- ceil(Ri×Mintra,i,j) in gaps where Minter,i,j=0, where *j*=0…(160/MGRP)-1

- measurement object *i* is an inter-frequency or inter-RAT measurement object or NR PRS measurements for positioning in a [single] positioning frequency layer, CSSFwithin\_gap,i is the maximum among

- ceil(Ri×Kinter×Minter,i,j) in gaps where Mintra,i,j ≠0, where *j*=0…(160/MGRP)-1

- ceil(Ri×Minter,i,j)in gaps where Mintra,i,j=0, where *j*=0…(160/MGRP)-1

Where Ri is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for a long-periodicity measurement defined above.

CSSFwithin\_gap,k=1 during TDetect, E-UTRAN FDD specified in clause 9.4.4.1.2.2 and TDetect, E-UTRAN TDD specified in clause 9.4.4.2.2.2, where k is the carrier frequency where the UE is performing cell detection of the inter-RAT E-UTRA OTDOA assistance data reference cell when acquiring the subframe and slot timing of the cell according to clause 9.4.4. In this case, the UE cell identification and measurement periods derived based on CSSFwithin\_gap,i in clauses 9.2.5.1, 9.2.5.2, 9.2.6.2, 9.2.6.3, 9.3.4, 9.3.5, 9.4.2.2, and 9.4.2.3 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with TDetect, E-UTRAN FDD and TDetect, E-UTRAN TDD.

##### 9.1.5.2.3 NE-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index *i* is designated as CSSFwithin\_gap,i and is derived as described in this clause.

If measurement object *i* refers to a long-periodicty measurement which is any of:

- an E-UTRA RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured, or

- an NR PRS measurement for positioning based on PRS configurations in Table 9.1.5.2.2-1

then CSSFwithin\_gap,i=1. Otherwise, the CSSFwithin\_gap,i for other measurement objects (including E-UTRA RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap *j* not used for a long-periodicity measurement defined above, count the total number of intra-frequency measurement objects and inter-frequency/inter-RAT measurement objects and NR PRS measurements for positioning in a [single] positioning frequency layer which are candidates to be measured within the gap *j*.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

- An inter-RAT measurement object is a candidate to be measured in all measurement gaps.

- An inter-frequency E-UTRA measurement object is a candidate to be measured in all measurement gaps.

- An NR PRS measurement for positioning is a candidate to be measured in a gap if at least one PRS symbol is covered by the MGL excluding RF swtiching time.

For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis. For UEs which support and are configured with per FR gaps, the CSSF requirements do not apply when NR PRS measurement in one FR gap collides with SSB/CSI-RS/PRS measurements in the other FR gap in time domain.

If the number of configured interfrequency and interRAT measuerement objects and NR PRS measurements for positioning in a [single] positioning frequency layer is non-zero and the UE is configured with per UE gaps, or if the UE is configured with per FR gaps:

FR1 and FR2 intrafrequency measurement objects belong to group A

Interfrequency and interRAT measurement objects belong to group B

MgroupA,i,j: Sum of the number of FR1 intra-frequency measurement objects Mintra-FR1,i,j and the number of FR2 intra-frequency measurement objects Mintra-FR2,i,j which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise MgroupA,i,j equals 0.

MgroupBi,j: Number of NR inter-frequency, EUTRA inter-RAT and UTRA inter-RAT measurement objects and NR PRS measurements for positioning in a [single] positioning frequency layer which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise MgroupB,i,j equals 0.

If the number of configured inter-frequency and inter-RAT measuerement objects and NR PRS measurements for positioning in a [single] positioning frequency layer is zero and the UE is configured with per UE gaps:

FR1 intrafrequency measurement objects belong to group A

FR2 intrafrequency measurement objects belong to group B

MgroupA,i,j: The number of FR1 intrafrequency measurement objects Mintra-FR1,i,j which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise MgroupA,i,j equals 0.

MgroupBi,j : The number of FR2 intrafrequency measurement objects Mintra-FR2,i,j which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise MgroupB,i,j equals 0.

Mtot,i,j = MgroupA,i,j + MgroupB,i,j : Total number of group A and group B measurement objects which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise Mtot,i,j equals 0.

For each measurement gap *j* used for a long-periodicity measurement defined above, Mintra,i,j = Minter,i,j = Mtot,i,j =0.

The carrier specific scaling factor CSSFwithin\_gap,i is given by:

If *measGapSharingScheme* is equal sharing, CSSFwithin\_gap,i= max(ceil(Ri×Mtot,i,j)), where *j*=0…(160/MGRP)-1

If *measGapSharingScheme* is not equal sharing and

- measurement object *i* is a group A measurement object, CSSFwithin\_gap,i is the maximum among

- ceil(Ri×Kintra×MgroupA,i,j) in gaps where MgroupB,i,j≠0, where *j*=0…(160/MGRP)-1

- ceil(Ri×MgroupA,i,j) in gaps where MgroupB,i,j=0, where *j*=0…(160/MGRP)-1

- measurement object *i* is an group B measurement object, CSSFwithin\_gap,i is the maximum among

- ceil(Ri×Kinter×MgroupBi,j) in gaps where MgroupA,i,j ≠0, where *j*=0…(160/MGRP)-1

- ceil(Ri×MgroupB,i,j)in gaps where MgroupA,i,j=0, where *j*=0…(160/MGRP)-1

Where Ri is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for a long-periodicity measurement defined above.

##### 9.1.5.2.4 NR-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index *i* is designated as CSSFwithin\_gap,i and is derived as described in this clause.

If measurement object *i* refers to a long-periodicity measurement which is any of:

- an E-UTRA RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured, or

- an NR PRS measurement for positioning with configurations of maximum *DL-PRS-Periodicity* and maximum bitmap size of *DL-PRS-MutingPattern* among its PRS resource sets as in Table 9.1.5.2.2-1

then CSSFwithin\_gap,i=1. Otherwise, the CSSFwithin\_gap,i for other measurement objects (including E-UTRA RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the CSSFwithin\_gap,i are derived as below.

For each measurement gap *j* not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 160ms period, count the total number of intra-frequency measurement objects and inter-frequency/inter-RAT measurement objects and NR PRS measurements for positioning in a [single] positioning frequency layer which are candidates to be measured within the gap *j*.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

- An inter-RAT measurement object is a candidate to be measured in all measurement gaps.

- An NR PRS measurement for positioning is a candidate to be measured in a gap if at least one PRS symbol is covered by the MGL excluding RF swtiching time.

For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis. For UEs which support and are configured with per FR gaps, the CSSF requirements do not apply when NR PRS measurement in one FR gap collides with SSB/CSI-RS/PRS measurements in the other FR gap in time domain.

If the number of configured interfrequency and interRAT measuerement objects and NR PRS measurements for positioning in a [single] positioning frequency layer is non-zero and the UE is configured with per UE gaps, or if the UE is configured with per FR gaps:

FR1 and FR2 intrafrequency measurement objects belong to group A

Interfrequency and interRAT measurement objects and NR PRS measurements for positioning in a [single] positioning frequency layer belong to group B

MgroupA,i,j: Sum of the number of FR1 intra-frequency measurement objects Mintra-FR1,i,j and the number of FR2 intra-frequency measurement objects Mintra-FR2,i,j which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise MgroupA,i,j equals 0.

MgroupBi,j : Number of NR inter-frequency, EUTRA inter-RAT and UTRA inter-RAT measurement objects and NR PRS measurements for positioning in a [single] positioning frequency layer which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise MgroupB,i,j equals 0.

If the number of configured interfrequency and interRAT measuerement objects and NR PRS measurements for positioning in a [single] positioning frequency layer is zero and the UE is configured with per UE gaps:

FR1 intrafrequency measurement objects belong to group A

FR2 intrafrequency measurement objects belong to group B

MgroupA,i,j: The number of FR1 intrafrequency measurement objects Mintra-FR1,i,j which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise MgroupA,i,j equals 0.

MgroupBi,j : The number of FR2 intrafrequency measurement objects Mintra-FR2,i,j which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise MgroupB,i,j equals 0.

Mtot,i,j = MgroupA,i,j + MgroupB,i,j : Total number of group A and group B measurement objects which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise Mtot,i,j equals 0.

For each measurement gap *j* used for a long-periodicity measurement defined above, Mintra,i,j = Minter,i,j = Mtot,i,j =0.

The carrier specific scaling factor CSSFwithin\_gap,i is given by:

If *measGapSharingScheme* is equal sharing, CSSFwithin\_gap,i= max(ceil(Ri×Mtot,i,j)), where *j*=0…(160/MGRP)-1

If *measGapSharingScheme* is not equal sharing and

- measurement object *i* is a group A measurement object, CSSFwithin\_gap,i is the maximum among

- ceil(Ri×Kintra×MgroupA,i,j) in gaps where MgroupB,i,j≠0, where *j*=0…(160/MGRP)-1

- ceil(Ri×MgroupA,i,j) in gaps where MgroupB,i,j=0, where *j*=0…(160/MGRP)-1

- measurement object *i* is an group B measurement object, CSSFwithin\_gap,i is the maximum among

- ceil(Ri×Kinter×MgroupBi,j) in gaps where MgroupA,i,j ≠0, where *j*=0…(160/MGRP)-1

- ceil(Ri×MgroupB,i,j)in gaps where MgroupA,i,j=0, where *j*=0…(160/MGRP)-1

Ri is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for a long-periodicity measurement defined above.

##### 9.1.5.2.5 SA mode: carrier-specific scaling factor for NR PRS measurements performed within gaps

The requirements specified for NR PRS measurements for positioning in clause 9.1.5.2.2 apply for NR PRS measurements for positioning in clause 9.9.

##### 9.1.5.2.6 NE-DC: carrier-specific scaling factor for NR PRS measurements performed within gaps

The requirements specified for NR PRS measurements for positioning in clause 9.1.5.2.3 apply for NR PRS measurements for positioning in clause 9.9.

##### 9.1.5.2.7 NR-DC: carrier-specific scaling factor for NR PRS measurements performed within gaps

The requirements specified for NR PRS measurements for positioning in clause 9.1.5.2.4 apply for NR PRS measurements for positioning in clause 9.9.

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| **End of Change 2** |