**3GPP TSG-RAN WG4 Meeting #111 draft R4-2408912**

**Fukuoka, Japan, 20th- 24th May 2024**

**Title:** Topic summary for [111][101] Upto\_R17\_UERF\_maintenance\_Part1

**Source:** Moderator (OPPO)

**Agenda item:** 4.8

**Document for:** Information

# Introduction

This is the summary for Rel-15/16 maintenance under agenda 4.1.

**List of topics below:**

Discussion papers and corresponding CRs (10)

CRs for 38.101-1 (36)

CRs for 38.101-2 (2)

CRs for 38.101-3 (10)

CRs for 38.101-5 (7)

CRs for other spec (2)

# Discussion papers and corresponding CRs (16)

## Contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2407075 (R16) | Apple | **On inter-band CA and NR-DC between FR1 and FR2****Observation 1:** For inter-band CA and NR-DC between FR1 and FR2, there is no explicit indication on UL MIMO support for FR1 carrier within the configurations in the current RAN4 specifications.**Observation 2:** For inter-band combinations between FR1 and FR2, UL RF requirements are independently specified for FR1 and FR2.**Observation 3:** Many existing UEs are already capable of supporting FR1 UL MIMO under inter-band CA or NR-DC between FR1 and FR2 where the feature is also supported by the current RAN2 signaling design.**Observation 4:** In current RAN4 specifications for inter-band CA between FR1 and FR2 UE maximum output power, the individual feature referencing to the corresponding sub-clauses in technical specifications could become quite cumbersome if more UL features would be supported.**Proposal 1:** Revise the current RAN4 specifications for inter-band CA between FR1 and FR2 by replacing the explicit feature indication in UE maximum output power sub-clause with a general referencing to FR1 and FR2 specifications respectively such that all the existing independent UL features between FR1 and FR2 can be implicitly supported.**Proposal 2:** Make the above proposed specifications revision starting from Rel-16. |
| R4-2407076(R16)CAT-A:R4-2407077R4-2407078 | Apple | CR to 38.101-3 on enabling missing UL feature support for inter-band CA between FR1 and FR2 |
| R4-2407220 (R16) | Apple | **On issues with NS\_24****Observation 1**: With respect to NS\_24 there exists a misalignment between the LTE and NR specs. LTE defines comprehensive frequency ranges for carrier placements and therefore allows A-MPR for all potential carrier frequencies at the upper part of band 65. This stands in contrast with the restrictive carrier placements in NR where only a set of discrete carrier frequencies are defined for A-MPR usage.**Observation 2:** The limitation of carrier centre frequencies in NR unnecessarily reduces the network configuration flexibility.**Proposal:** Align LTE and NR by introducing the same ranges for the carrier centre frequencies to NR as proposed in CR R4-2407217.  |
| R4-2407217(R16)CAT-A:R4-2407218R4-2407219 | Apple | CR to align NR carrier centre frequencies with LTE for NS\_24 |
| R4-2407961 | Qualcomm Incorporated | (NR\_newRAT-Core) Intra-band EN-DC channel spacing issue **Observation 1: Defining intra-band non-contiguous EN-DC to include case when channel spacing is equal to nominal creates a superposition of requirements.****Observation 2: Changing specifications of the closed release with functional changes will create an unrecoverable mismatch between 3GPP specifications and fielded devices** **Observation 3: New features can be added to closed releases under new capabilities.** **Observation 4: Superposition of requirements make conformance testing impossible****Observation 5: 3GPP already has a feature to cover the deployment of intra-band EN-DC with nominal channel spacing.** **Observation 6: The change would possible make requirements for contiguous EN-DC redundant****Observation 7: NR-U changes did not create the superposition of the requirements problem as described in section 2.2.**And two proposals**Proposal 1: Ran4 will not define new features to closed releases****Proposal 2: Ran4 to carefully analyse impact of the applicable requirements before agreeing to changes**  |
| R4-2407615 (R17) | Huawei, HiSilicon | (NR\_newRAT-Core) Discussion on the channel spacing for intra-band EN-DC**Observation 1:** In RAN4’s understanding, a UE supports non-contiguous case also supports contiguous case.**Observation 2:** The definition of non-contiguity in intra-band EN-DC by channel spacing rule in current spec may be the main cause to the UE indicating ‘non-contiguous’ via intraBandENDC-Support not able to access to the NW configured with nominal channel spacing in the field.**Observation 3:** In RAN2 specification, ‘non-contiguous’ indicated by intraBandENDC-Support means that the UE only supports non-contiguous spectrum in the intra-band EN-DC, rather than non-contiguous and contiguous.**Proposal 1:** RAN4 shall extend the channel spacing rule for non-contiguous intra-band EN-DC to “equal to and/or larger than the nominal channel spacing” to align with RAN4’s understanding dating back to Rel-17.**Proposal 2:** To introduce an optional capability of enhanced channel spacing for intra-band EN-DC, so that UE can access to the intra-band contiguous EN-DC carriers despite reporting ‘non-contiguous’ by intraBandENDC-Support |
| R4-2408910(R17)CAT-A:R4-2407617 | Huawei, HiSilicon | (NR\_newRAT-Core)R17 Cat-F CR 38.101-3 channel spacing for intra-band EN-DC |
| R4-2407633 (R16) | Samsung | Ambiguity on the order for component carriers for EN-DC***Proposal 1: Add the following clarification Note into Table 5.3B.1.2-1 and Table 5.3B.1.3-1 of TS 38.101-3 from Rel-16, to instruct the NW algorithm implementation.***NOTEX: When an EN-DC configuration contains multiple component carriers within an E-UTRA band or a NR band, the component carriers are listed in the order of increasing carrier frequency within the E-UTRA band or the NR band. |
| R4-2407634(R16)CAT-A:R4-2407635R4-2407636 | Samsung, CHTTL | (DC\_R16\_1BLTE\_1BNR\_2DL2UL-Core) CR for 38.101-3 Address the ambiguity on the order for component carriers for EN-DC |
| R4-2408802 | Qualcomm Inc. | [NR\_n41\_BW-Core] Clarifications on NS\_47 requirements**Observation 1:** NS\_47 requirements in NR and having no additional requirements in LTE for the same case are based on specific assumptions on used channel bandwidths and their center frequencies, while no restrictions or clarifications on this are present in RAN4 specifications.**Proposal 1:** RAN4 to consider whether there is a need make either normative or informative additions to NR and/or LTE specifications to make NS\_47 requirements clearer. Consider e.g.* Center frequency restrictions for 15 and 20 MHz CBW
* Applicability of 25 MHz CBW
* Requirements being met for 20 MHz and narrower CBW by fulfilling general SEM with the center frequency restrictions in place.
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| R4-2409681 | Nokia | (NR\_NTN\_Solutions) On the definition of geosynchronous satellites |

## Open issues summary

### Sub-topic 1-1 General reference to FR1 and FR2 spec

**Issue 1-1-1: Whether to revise the 101-3 spec with general reference to FR1 and FR2 spec independently?**

**Proposal 1:** Revise the current RAN4 specifications for inter-band CA between FR1 and FR2 by replacing the explicit feature indication in UE maximum output power sub-clause with a general referencing to FR1 and FR2 specifications respectively such that all the existing independent UL features between FR1 and FR2 can be implicitly supported. (R4-2407075, Apple)



**Proposal 2:** Make the above proposed specifications revision starting from Rel-16. (R4-2407075, Apple)

Recommended WF:

Moderator note: Corresponding 38101-3 CRs are R4-2407076, R4-2407077, R4-2407078 as below.

**Issue 1-1-2: Corresponding CRs**

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| **T-doc** | **Company** | **Title/Comments** | **Recommend** |
| R4-2407076(R16)CAT-A:R4-2407077R4-2407078 | Apple | CR to 38.101-3 on enabling missing UL feature support for inter-band CA between FR1 and FR2 |  |

### Sub-topic 1-2 Align LTE/NR freq range for NS\_24

**Issue 1-2-1: Whether to align LTE/NR freq range for NS\_24?**

**Proposal:** Align LTE and NR by introducing the same ranges for the carrier centre frequencies to NR as proposed in CR R4-2407217. (R4-2407220, Apple)

Recommended WF:

Moderator note: Corresponding CRs for 38.101-1 are R4-2407217, R4-2407218, R4-2407219 as below.

**Issue 1-2-2: Corresponding CRs**

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| **T-doc** | **Company** | **Title/Comments** | **Recommend** |
| R4-2407217(R16)CAT-A:R4-2407218R4-2407219 | Apple | CR to align NR carrier centre frequencies with LTE for NS\_24 |  |

### Sub-topic 1-3 Intra-band EN-DC channel spacing

**Issue 1-3-1: Whether to revise intra-band EN-DC channel spacing definition?**

**Proposal 1:** Ran4 will not define new features to closed releases. (R4-2407961, QC)

**Proposal 2:** Ran4 to carefully analyse impact of the applicable requirements before agreeing to changes. (R4-2407961, QC)

**Proposal 3:** RAN4 shall extend the channel spacing rule for non-contiguous intra-band EN-DC to “equal to and/or larger than the nominal channel spacing” to align with RAN4’s understanding dating back to Rel-17. (R4-2407615, HW)

**Proposal 4:** To introduce an optional capability of enhanced channel spacing for intra-band EN-DC, so that UE can access to the intra-band contiguous EN-DC carriers despite reporting ‘non-contiguous’ by *intraBandENDC-Support*. (R4-2407615, HW)

Recommended WF:

Moderator note: Corresponding CRs from HW for 38.101-3 are R4-2408910, R4-2407617.

**Issue 1-3-2: Corresponding CRs**

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| **T-doc** | **Company** | **Title/Comments** | **Recommend** |
| R4-2408910(R17)CAT-A:R4-2407617 | Huawei, HiSilicon | (NR\_newRAT-Core)R17 Cat-F CR 38.101-3 channel spacing for intra-band EN-DC |  |

### Sub-topic 1-4 Ambiguity on the order for component carriers for EN-DC

**Issue 1-4-1: Whether to introduce new note to clarify the component carrier order in EN-DC?**

**Proposal 1:** Add the following clarification Note into Table 5.3B.1.2-1 and Table 5.3B.1.3-1 of TS 38.101-3 from Rel-16, to instruct the NW algorithm implementation. (R4-2407633, Samsung)

*NOTEX: When an EN-DC configuration contains multiple component carriers within an E-UTRA band or a NR band, the component carriers are listed in the order of increasing carrier frequency within the E-UTRA band or the NR band.*

Recommended WF:

Moderator note: Corresponding CRs from HW for 38.101-3 are R4-2407634, R4-2407635, R4-2407636 as below.

**Issue 1-4-2: Corresponding CRs**

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| **T-doc** | **Company** | **Title/Comments** | **Recommend** |
| R4-2407634(R16)CAT-A:R4-2407635R4-2407636 | Samsung, CHTTL | (DC\_R16\_1BLTE\_1BNR\_2DL2UL-Core) CR for 38.101-3 Address the ambiguity on the order for component carriers for EN-DC |  |

### Sub-topic 1-5 Clarifications on NS\_47 requirements

**Issue 1-5-1: Whether to clarify NS\_47 requirements?**

**Proposal 1:** RAN4 to consider whether there is a need make either normative or informative additions to NR and/or LTE specifications to make NS\_47 requirements clearer. Consider e.g.

* Center frequency restrictions for 15 and 20 MHz CBW
* Applicability of 25 MHz CBW
* Requirements being met for 20 MHz and narrower CBW by fulfilling general SEM with the center frequency restrictions in place. (R4-2408802, QC)

Recommended WF:

# CRs for 38.101-1 (36)

## CRs

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| **T-doc** | **Company** | **Title** | **Recommend** |
| R4-2407065 (R17)CAT-A:R4-2407066 | Apple | CR to fix CBW listing of NS\_37 emission requirements |  |
| R4-2407079(R17)CAT-A:R4-2407080 | Apple | CR to 38.101-1 on Wgap correction for CA\_n2(2A) REFSENS requirement |  |
| R4-2407320(R17)CAT-A:R4-2407321 | Ericsson | (NR\_redcap-Core) Correction of the channel raster for RedCap UEs by added entries |  |
| R4-2407378(R17)CAT-A:R4-2407379 | Sony, Ericsson | CR for TS 38.101-1 Rel-17 correcting maximum transmission bandwidth for NS\_04 |  |
| R4-2407534(R17)CAT-A:R4-2407535 | CATT | draftCR to TS 38.101-1 on PC1.5 MPR for UL-MIMO |  |
| R4-2408909(R17)CAT-A:R4-2407603 | Huawei, HiSilicon | (NR\_CADC\_R17\_3BDL\_2BUL) CR to 38.101-1: Adding note to CA\_n7-n8-n78 for IMD4 |  |
| R4-2407680(R17)CAT-A:R4-2407681 | Skyworks Solutions Inc. | CR to R17 38.101-1 to add 25MHz CBW to NS\_18 emissions requirement |  |
| R4-2407684(R16) | Huawei, HiSilicon | (NR\_newRAT-Core) Correction of Delta Ppowerclass and Delta TRxSRS for SRS antenna switching |  |
| R4-2407685(R17) | Huawei, HiSilicon | (NR\_newRAT-Core/NR\_RF\_TxD-Core) Correction of Delta Ppowerclass and Delta TRxSRS for SRS antenna switching |  |
| R4-2407812(R17)CAT-A:R4-2407813 | Xiaomi | (NR\_RF\_FR1\_enh-Core) CR to 38.101-1 R17 corrections on Pcmax tolerance for intra-band contiguous CA with UL MIMO |  |
| R4-2407827(R17)CAT-A:R4-2407828 | Xiaomi | CR for Rel-17 to correct the signalling IE for FR1 Intra-band non-contiguous CA in clause 6.2A.2.2.0. |  |
| R4-2408029(R17) | LG Electronics France | CR on MSD value correction for power class 5 cross band isolation |  |
| R4-2408072(R16)CAT-A:R4-2408052R4-2408053 | Huawei, HiSilicon | [LTE\_NR\_DC\_CA\_enh] CR to TS 38.101-1: correction of Pcmax tolerance for NR DC (Rel-16) |  |
| R4-2408054(R16)CAT-A:R4-2408055R4-2408056 | Huawei, HiSilicon | [5G\_V2X\_NRSL] CR to TS 38.101-1: correction of Pcmax tolerance for sidelink (Rel-16) |  |
| R4-2408366(R15)CAT-A:R4-2408367 | ZTE Corporation, Sanechips | (NR\_newRAT-Core) Correct the Pcmax tolerance for inter-band CA |  |
| R4-2408368(R17)CAT-A:R4-2408369 | ZTE Corporation, Sanechips | (NR\_newRAT-Core) Correct the Pcmax tolerance for inter-band CA and TxD |  |
| R4-2408227(R17) | Anritsu Limited | (NR\_RF\_FR1\_enh-Core) CR to add clarification regarding the configurations of the UL CCs for suffix H - TS38.101-1, Rel-17, Cat-F |  |
| R4-2408228(R16) | Anritsu Limited | (NR\_CA\_R16\_intra-Core) CR to add notes for SCS restrictions on CBWs in CA configurations - TS38.101-1, Rel-16 |  |
| R4-2408229(R17) | Anritsu Limited | (NR\_CA\_R16\_intra-Core, ) CR to add notes for SCS restrictions on CBWs in CA configurations - TS38.101-1, Rel-17 |  |
| R4-2408231(R17)CAT-A:R4-2408232 | Anritsu Limited | (NR\_CADC\_R17\_3BDL\_2BUL) CR to correct n66 transmission bandwidth used in REFSENS exceptions due to IMD5 for CA\_n5-n48-n66 - TS38.101-1, Rel-17 |  |
| R4-2408417(R16)CAT-A:R4-2408418R4-2408425 | Skyworks Solutions Inc., Nokia | CR to TS 38.101-1 Rel-16 NR-U Nominal channel spacing*Moderator note: Tdoc was not uploaded before meeting.* |  |
| R4-2408442(R15)CAT-A:R4-2408471 | Skyworks Solutions Inc. | Cat F CR to TS 38.101-1 Rel-15 REFSENS Corrections*Moderator note: Tdoc was not uploaded before meeting.* |  |
| R4-2408476(R17)CAT-A:R4-2408478 | Skyworks Solutions Inc. | Cat F CR to TS 38.101-1 Rel-17 REFSENS Corrections*Moderator note: Tdoc was not uploaded before meeting.* |  |
| R4-2408674(R17) | Huawei, HiSilicon, Rakuten | (NR\_FR1\_lessthan\_5MHz\_BW-Core) CR on 38.101-1 v17.13 clarifications on reporting asymmetric channel bandwidth combination set |  |
| R4-2408783(R17)CAT-A:R4-2408784 | ZTE Corporation, Sanechips | (NR\_RF\_FR1\_enh-Core) CR for TS 38.101-1: Add ACLR requirement for PC2 intra-band non-contiguous UL CA |  |
| R4-2408785(R17)CAT-A:R4-2408786 | ZTE Corporation, Sanechips | (NR\_RF\_FR1\_enh-Core) CR for TS 38.101-1: Corrections on intra-band UL contiguous CA with UL MIMO for PC3 |  |
| R4-2408800(R16)CAT-A:R4-2408801 | Qualcomm Inc. | [NR\_RF\_FR1-Core] CR to TS 38.101-1: Almost contiguous RB allocations |  |
| R4-2408845(R16) | Qualcomm France, Skyworks Inc. | Adding missing MSD for CA\_n2A-n66A and for CA\_n25A-n66A PC3 |  |
| R4-2408846(R17) | Qualcomm France, Skyworks Inc. | Adding missing MSD for CA\_n2A-n66A and for CA\_n25A-n66A PC3 |  |
| R4-2408850(R17) | Qualcomm France | CR on clarification on overlapping DL/SUL bands |  |
| R4-2409183(R17)CAT-A:R4-2409184 | Huawei, HiSilicon | (NR\_newRAT-Core) CR for TS 38.101-1: Reconsideration on ?TRxSRS for ultra high band |  |
| R4-2409492(R15)CAT-A:R4-2409493R4-2409494R4-2409495 | ZTE Corporation, Sanechips | (NR\_newRAT-Core) CR for TS 38.101-1 on UE additional spurious emissions (R15) |  |
| R4-2409523(R17)CAT-A:R4-2409524 | Huawei, HiSilicon | CR to TS 38.101-1: Clarification on band-specific post antenna gain values for the FRMCS operation |  |
| R4-2409525(R17)CAT-A:R4-2409526 | Huawei, HiSilicon | CR to TS 38.104: clarifications on RMR terminology and related operating bands |  |
| R4-2409528(R17)CAT-A:R4-2409529 | Huawei, HiSilicon | CR to TS 38.101-1: Correction of NR operating band notes |  |
| R4-2407920 (R17) CAT-A:R4-2407921 | Huawei, HiSilicon | (NR\_CADC\_R18\_3BDL\_xBUL) draft CR for TS 38101-1 correction the misuse of the '\_' symbol for CA\_n7-n25-n66 etc*Moderator note: R4-2407920 now is CAT-A should be CAT-F;**R4-2407920 now is CAT-F should be CAT-A;* |  |

# CRs for 38.101-2 (2)

## CRs

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| **T-doc**  | **Company** | **Title/Comments** | **Recommendation** |
| R4-2408882(R17)CAT-A:R4-2408883 | Samsung | (NR\_CA\_R17\_intra-Core) CR for 38.101-2 to correct UL configurations for intra-band non-contiguous CA |  |
| R4-2409179(R15)CAT-A:R4-2409180R4-2409181R4-2409182 | Huawei, HiSilicon | (NR\_newRAT-Core) CR for TS 38.101-2: Correction on the modifiedMPR table |  |

# CRs for 38.101-3 (9)

## CRs

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| **T-doc** | **Company** | **Title/Comments** | **Recommend** |
| R4-2407594(R17)CAT-A:R4-2407595 | Samsung | (NR\_CADC\_R17\_3BDL\_2BUL-Core) Rel-17 Cat F CR for TS 38.101-3 to correct three-band NR-CA combinations including FR2 |  |
| R4-2407638(R17)CAT-A:R4-2407639 | Samsung | (NR\_CADC\_R17\_2BDL\_xBUL) CR for 38.101-3 Add the missing fallbacks for FR1+FR2 combos |  |
| R4-2407957 (R17) | CHTTL, Huawei, LGE | (DC\_R17\_xBLTE\_2BNR\_yDL2UL) CR for TS 38.101-3: Corrections on NE-DC configurations (Rel.17) |  |
| R4-2407958 (R18) | CHTTL, Huawei, LGE | (DC\_R17\_xBLTE\_2BNR\_yDL2UL) CR for TS 38.101-3: Corrections on NE-DC configurations (Rel.18) |  |
| R4-2408068(R16)CAT-A:R4-2408070R4-2408079 | CHTTL, Skyworks | (DC\_R16\_1BLTE\_1BNR\_2DL2UL) CR for TS 38.101-3: Correction on inconsistent UL EN-DC configurations |  |
| R4-2408769(R15)CAT-A:R4-2408770R4-2408771R4-2408772 | OPPO, Rohde & Schwarz | Clarification of general spurious emission test range in ENDC (R15) |  |
| R4-2408880(R17)CAT-A:R4-2408881 | Samsung | (DC\_R17\_2BLTE\_1BNR\_3DL2UL-Core) CR for 38.101-3 to correct uplink EN-DC configuration for DC\_5A-66A\_n261J |  |
| R4-2409228(R17)CAT-A:R4-2409237 | Verizon, Ericsson, Samsung | TS 38.101-3: CR for correction of MSD values |  |
| R4-2409449(R17)CAT-A:R4-2409450 | Huawei, HiSilicon | (DC\_R17\_3BLTE\_1BNR\_4DL2UL-Core) CR for TS 38.101-3 to add the missing UL configuration CA\_3C\_n78A for DC\_1A-3C-28A\_n78A (R17) |  |

# CRs for 38.101-5 (7)

## CRs

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| **T-doc** | **Company** | **Title/Comments** | **Recommend** |
| R4-2407042(R17) | Apple, Globalstar, Thales, Inmarsat, Viasat, Terrestar | Clarification for applicability of DSS for NTN FR1 bands |  |
| R4-2407043(R18) | Apple, Globalstar, Thales, Inmarsat, Viasat, Terrestar | Clarification for applicability of DSS for NTN FR1 bands |  |
| R4-2408787(R17)CAT-A:R4-2408788 | ZTE Corporation, Sanechips | (NR\_NTN\_solutions-Core) CR for TS 38.101-5: Corrections on REFSENS for band n256 |  |
| R4-2409339(R17)CAT-A:R4-2409340 | Huawei, HiSilicon | (NR\_NTN\_solutions-Core) CR for TS 38.101-5 to clarify the applicability for different requirements (R17) |  |
| R4-2409496(R17)CAT-A:R4-2409497 | ZTE Corporation, Sanechips | (NR\_NTN\_solutions-Core) CR for TS 38.101-5 on UE additional maximum output power reduction (R17) |  |
| R4-2409546(R17)CAT-A:R4-2409547 | Huawei, HiSilicon | CR to TS 38.101-5: Terminology alignment with SAN RF specification |  |
| R4-2409682(R17)CAT-A:R4-2409683 | Nokia | (NR\_NTN\_Solutions) CR on 38101-5 clarification of terminology for GSO (Rel.17) |  |

# CRs for other spec (2)

## CRs

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| **T-doc** | **Company** | **Title/Comments** | **Recommend** |
| R4-2407044(R17)CAT-A:R4-2407045 | Apple, Globalstar, Thales, Inmarsat, Viasat, Terrestar | Clarification for applicability of DSS for NTN FR1 bands(38.108) |  |
| R4-2409391 | Nokia | (FS\_NR\_newRAT) CR to TR 38.803 on corrections of acronyms and references |  |