

[91E][39]FR1_FR2_ambiguity email summary - Version 0.0.5
RAN

3GPP TSG-RAN Meeting #91-e RP-210895

Electronic Meeting, March 16-26, 2021

Agenda Item: 14

Source: Moderator (Huawei, HiSilicon)

Document for: Information

1 Introduction

The ambiguity issue for FR1-FR2 bandwidth combination set (BCS) was identified and candidate solutions were provided ^[1-3].

In 38.101-3, the bandwidth combination set is defined in FR1-FR2 NR CA configuration (Table 5.5A.1-1 of TS38.101-3), while no similar bandwidth combination set is defined in FR1-FR2 NR DC configuration (Table 5.5B.7-1 of TS38.101-3). For FR1-FR2 NR DC configuration, the bandwidth combinations for FR1 and FR2 are defined in TS38.101-1 and TS38.101-2 respectively by a note, i.e., *NOTE 1: NR configuration for FR1 and FR2 are defined in TS 38.101-1 [2] and TS 38.101-2 [3] respectively* in Table 5.5B.7-1 of TS38.101-3.

In 38.331 the similar IE *supportedBandwidthCombinationSet* as used for FR1-FR2 NR CA is used to indicate the supported bandwidth combination(s) for FR1-FR2 NR DC configuration. So there seems ambiguity for indicating and applying bandwidth combination(s) for FR1-FR2 NR DC configuration.

In this email thread, companies are invited to discuss and address the issue.

2 Initial round

2.1 Company proposals

In [1] the proponent raised the issue and provided two optional solutions to address the issue, which are copied below.

Observed Ambiguity in 38.101-3

Question: Which Bandwidth Combination Sets (BCS) apply for FR1-FR2 Dual Connectivity?

Interpretation A: BCSs for FR1+FR2 DC are inherited from FR1 CA tables in 38.101-1 and from FR2 CA tables in 38.101-2

Bullet 1: Inline with text in tables in section 5.5B.7: "NOTE 1: NR configuration for FR1 and FR2 are defined in TS 38.101-1 [2] and TS 38.101-2 [3] respectively."

Bullet 2: Unclear how to lookup two BCS rows in two specs with a single supportedBandwidthCombinationSet ID in ASN.1.

Bullet 3: BCS-lookup and definitions would be different for FR1-FR2 DC and CA (unless BCSs in 101-3 are removed for CA)

*Bullet 4: **Required changes:***

1) Change so that supportedBandwidthCombinationSet ID is used for BCS-lookup in 38.101-1 (FR1)

2) If RAN4 introduces as BCS>0 in 38.101-2, RAN2 needs to add a supportedBandwidthCombinationSet-FR2 to ASN.1

3) For FR1+FR2 CA, remove BCS definitions in tables in 38.101-3 and refer instead to BCS definitions in 38.101-1 and 38.101-2

Interpretation B: BCSs for FR1+FR2 DC are inherited from FR1+FR2 CA tables in 38.101-3 (section 5.5A.1)

Bullet 1: Similar to BCS lookup for FR1+FR1 DC in FR1 CA tables (see 38.101-1): "For an NR DC configuration specified in 5.5B.1-1, the bandwidth combination sets for the corresponding NR CA configuration in 5.5A.3 {...} are applicable"

Bullet 2: The existing supportedBandwidthCombinationSet signaled in ASN.1 is sufficient for the lookup.

*Bullet 3: **Required change:** Change 38.101-3 so that FR1+FR2 CA tables in 38.101-3 are used for BCS lookup*

Proposals:

Proposal 1: Resolve the BCS ambiguity in 38.101-3 to allow for timely product implementation and to avoid compatibility issues with early UEs on the market.

Proposal 2: BCSs for FR1+FR2 DC are inherited from FR1+FR2 CA tables in 38.101-3 (section 5.5A.1)

Proposal 3: Approve the corresponding CR (Interpretation B)

Company CRs for 38.101-3 are in RP-210666 (Interpretation A) and RP-210667 (Interpretation B)

2.2 Issues and comments

For the initial round, companies are invited to provide feedback on whether the issue exists, the comments on Interpretation A and Interpretation B, and the feedback on Proposal 2 and Proposal 3.

Issue #1: Do the companies agree that there is the FR1-FR2 BCS ambiguity issue?

Companies are invited to provide the comments below.

Feedback Form 1: Comments and responses for Issue #1

Item	Company	Comments
1	Ericsson LM	Ericsson (source company): Yes , the problem exists. And we would like to highlight that it is important to resolve the ambiguity quickly since UEs (and networks) are about to enter the market. Different interpretations between UE and network would lead to configuration failures.
2	Ericsson LM	Ericsson (source company): Interpretation B Referring from the FR1+FR2 NR-DC tables in 38.101-3 to the corresponding FR1+FR2 NR-CA tables in 38.101-3 avoids changes in ASN.1 (no need for an additional <i>supportedBandwidthCombinationSet</i>) and is in-line with the principle applied for BCS lookup for FR1+FR1 DC in FR1 CA tables.
3	ZTE Wistron Telecom AB	ZTE: Yes, thanks to Ericsson for spotting this ambiguity or discrepancy for FR1-FR2 NR DC. The current way in RAN4 specs for FR1-FR2 NR DC actually breaks the implicit convention that NR DC usually follows the CBW/SCS configurations of NR CA with the same band combination.
4	AT&T GNS Belgium SPRL	AT&T: Yes, we agree that there is an FR1-FR2 BCS ambiguity issue.
5	Apple (UK) Limited	Apple: We agree that there is FR1-FR2 BCS ambiguity issue in the current specifications.
6	Nokia Japan	Yes, we agree that there is an ambiguity. For insance, for single band FR1 + single band FR2 NR DC case, it is totally not clear what we refer to with the currently specified NOTE. In addition, there are some CA configuration with multiple BCSs, so that it is not clear if NR DC BCS means BCS0 for FR1 + BCS0 for FR2 or BCS1 for FR1 + BCS0 for FR2 etc...
7	CATT	CATT: agree that there is an ambiguity issue.
8	DOCOMO Commu- nications Lab.	Docomo: Yes
9	Samsung Electron- ics Co., Ltd	Yes, we also think it is an ambiguity issue and it is better to solve it ASAP
10	Intel Cor- poration (UK) Ltd	Yes, we agree that there is an ambiguity

Item	Company	Comments
11	China Telecom Corporation Ltd.	Agree there is the FR1-FR2 BCS ambiguity issue.
12	VODAFONE Group Plc	Yes, we agree there is an FR1-FR2 BCS ambiguity issue.
13	vivo Communication Technology	Yes, agree that there is an ambiguity issue.
14	Huawei Technologies France	Huawei, HiSilicon: Yes.
15	China Mobile Com. Corporation	Yes
16	Guangdong OPPO Mobile Telecom.	Yes, there is ambiguity

Issue #2: Any comment or question on Interpretation A and Interpretation B?

Companies are invited to provide the comments below.

Feedback Form 2: Comments and responses for Issue #2

Item	Company	Comments
1	Ericsson LM	Ericsson (source company): Interpretation B Referring from the FR1+FR2 NR-DC tables in 38.101-3 to the corresponding FR1+FR2 NR-CA tables in 38.101-3 avoids changes in ASN.1 (no need for an additional <i>supportedBandwidthCombinationSet</i>) and is in-line with the principle applied for BCS lookup for FR1+FR1 DC in FR1 CA tables.
2	ZTE Wistron Telecom AB	ZTE: Interpretation A breaks the implicit convention between NR CA and NR DC, and requires ASN.1 change, while Interpretation B follows the convention and restricts impacts within only RAN4 specs.
3	AT&T GNS Belgium SPRL	AT&T: We prefer Interpretation B for all of the reasons outlined above by Ericsson and it is a more future-proof solution.

Item	Company	Comments
4	Apple (UK) Limited	Apple: Thanks Ericsson for providing the two interpretations which are rather clear to understand. We do not have strong preference on either of the interpretations. If there is no foreseen BCS other than BCS0 in TS 38.101-2, interpretation A provides the advantage for specifications simplification in TS 38.101-3 as there is no need to copy the entire FR1 and FR2 configurations from TS 38.101-1 and TS 38.101-2 to FR1-FR2 inter-band CA configuration tables in TS 38.101-3, which are already quite large in current specifications and could become rather messy when new FR1 channel BWs such as 35 MHz and 45 MHz would be introduced.
5	Nokia Japan	Given that Terminal that supports inter-band NR-DC between FR1 and FR2 configuration shall meet the requirements for corresponding CA configuration (suffix A), unless otherwise specified, taking interpretation B is the simplest way to resolve the issue.
6	Qualcomm Korea	We support interpretation B
7	MediaTek Inc.	Our understanding is interpretation B. It also avoids ASN.1 impact in this very late stage.
8	CATT	considering the specification impact, we think option 2 is better. however we should ensure that corresponding inter-band CA configuration is always exists for an EN-DC combination.
9	CATT	CATT: Prefer Interpretation B to solve this issue. however we should ensure that the corresponding inter-band CA configuraiton always exists for en inter-band EN-DC combinaiton.
10	Samsung Electronics Co., Ltd	We supports interpretation B
11	DOCOMO Communications Lab.	Docomo: No strong view on which way to go. Interpretation A would simplify future specification work for DC, but with Interpretation B we have less spec impact.
12	Intel Corporation (UK) Ltd	Both interpretation A and B are acceptable for us. Considering the amount of work, Interpretation B seems to be more clear and simple.
13	China Telecom Corporation Ltd.	We support interpretation B by following the similar method with FR1+FR1 DC
14	VODAFONE Group Plc	WE support interpretation B due to the fact it is clearer/simpler and avoids ASN.1 impact.

Item	Company	Comments
15	vivo Commu- nication Technol- ogy	We have no strong view. Interpretation B is slightly preferred.
16	Huawei Tech- nologies France	Huawei, HiSilicon: Our preference is interpretation B.
17	China Mo- bile Com. Corpora- tion	Interpretation B is better.
18	Guangdong OPPO Mobile Telecom.	Interpretation B is ok

Issue #3: Any comment or question on Proposal 2 and Proposal 3?

Companies are invited to provide the comments below.

Feedback Form 3: Comments and responses for Issue #3

Item	Company	Comments
1	ZTE Wistron Telecom AB	ZTE: We would like to support Interpretation B with the considerations mentioned above: 1) It follows the same implicit convention between NR CA and NR DC; 2) It has minimized overall specs impacts.
2	Ericsson LM	We prefer Interpretation B (see explanations in our TDoc and in "feedback 2")
3	AT&T GNS Belgium SPRL	AT&T: We support Proposals 2 and 3.
4	Ericsson LM	We had initially provided only the Rel-17 CRs for the two possible variants in order to show all required changes. Of course, the ambiguity must be corrected also in Rel-15 and 16. Since most companies seem to favour Interpretation B, we uploaded the Rel-15, 16 and 17 CRs for that variant with following TDoc numbers. The actual change is the same as in the previous version of the Rel-17 CR: RP-210741, "CR 38.101-3 correcting FR1-FR2 BCS ambiguity – Interpretation B", Ericsson, 38.101-3, v15.12.0, CR0508, cat F, NR_newRAT-Core, RP-210742, "CR 38.101-3 correcting FR1-FR2 BCS ambiguity – Interpretation B", Ericsson, 38.101-3, v16.6.0, CR0509, cat A, NR_newRAT-Core, RP-210772, "CR 38.101-3 correcting FR1-FR2 BCS ambiguity – Interpretation B", Ericsson, 38.101-3, v17.0.0, CR0507r1, cat A, NR_newRAT-Core
5	Nokia Japan	Proposal 2 looks reasonable unless issues are found.

Item	Company	Comments
6	MediaTek Inc.	Support both Proposals 2 and 3. Since this is a very late issue, it is preferred to resolve it in this RP meeting.
7	CATT	CATT: Support Proposal 2 and 3.
8	Intel Corporation (UK) Ltd	Support Proposals 2 and 3.
9	China Telecom Corporation Ltd.	Support proposal 2 and 3, also interpretation B
10	VODAFONE Group Plc	Support proposal 2 and 3, and interpretation B.
11	vivo Communication Technology	Can support both.
12	Huawei Technologies France	Huawei, HiSilicon: Support Proposal 2 and 3.
13	China Mobile Com. Corporation	Support both proposals

2.3 Moderator summary from initial round

For Issue #1, 15 companies provided feedbacks and all companies agree that the issue exists.

For Issue #2, 17 companies provided feedbacks. 15 companies support or prefer Interpretation B in order to avoid the impact on ASN.1, minimize the impact of existing specifications, and/or align the specifications of bandwidth combination sets between FR1-FR2 NR-CA and FR1-FR2 NR-DC. 1 company can accept both Interpretation A and B. 1 company prefers Interpretation A considering specification simplification.

For Issue #3, 12 companies provided feedback. Almost all the companies agree on Proposal 2 and Proposal 3.

Based on the feedback, the moderator would like to recommend the following agreement

Bullet #1: BCSs for FR1+FR2 DC are inherited from FR1+FR2 CA tables in 38.101-3 (section 5.5A.1)

Bullet #2: Try to approve CRs to correct BCS for FR1+FR2 DC in this RAN meeting.

3 Intermediate round

3.1 Issues and comments

In the intermediate round, companies are invited to comment on the drafts of following CRs:

- 1) RP-210741, “CR38.101-3 correcting FR1-FR2 BCS ambiguity–Interpretation B”, Ericsson, 38.101-3, v15.12.0, CR0508, cat F, NR_newRAT-Core,
- 2) RP-210742, “CR38.101-3 correcting FR1-FR2 BCS ambiguity–Interpretation B”, Ericsson, 38.101-3, v16.6.0, CR0509, cat A, NR_newRAT-Core,
- 3) RP-210772, “CR38.101-3 correcting FR1-FR2 BCS ambiguity–Interpretation B”, Ericsson, 38.101-3, v17.0.0, CR0507r1, cat A, NR_newRAT-Core

Companies are invited to provide comments and responses below. If there is any revision, please proponent put the revised CRs in draft folder [91E][39]FR1_FR2_ambiguity in Inbox.

Feedback Form 4: Comments and responses for CRs

Item	Company	Comments
1	AT&T GNS Belgium SPRL	We are OK with the CRs in RP-210741, RP-210742, and RP-210772.
2	LG Elec- tronics Inc.	LGE: we support the correction CR and shadowing CRs to solve the BCS ambiguity of FR1_FR2 NR DC band combinations.
3	Intel Cor- poration (UK) Ltd	The proposed CRs are agreeable
4	ZTE Wistron Telecom AB	We are fine with the proposed CRs. A minor comment: it seems that the note is repeated in each table with different number of bands (More tables may be added with the increased number of bands). In order to remove this redundancy, perhaps we can move the note to somewhere so it is not repeated in each table.
5	CATT	We agree with the CRs in RP-210741, RP-210742, and RP-210772.
6	Nokia Japan	We agree with comments from ZTE. It is better to remove redundancy.
7	MediaTek Inc.	All CRs are fine to us.
8	Verizon UK Ltd	We agree the proposed CRs (RP-210741, RP-210742, and RP-210772) and they are Ok for us

Item	Company	Comments
9	Ericsson LM	As recommended by the moderator in bullet 3.2 below, we have uploaded a set of revised CRs (Rel-15, -16 and -17) in which the notes in the tables were removed and replaced by a statement in the beginning of the FR1-FR2 CA section: ftp://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_91e/Inbox/Drafts/[91E][39]FR1-FR2_amb Any further comments on the revised drafts are welcome.

3.2 Moderator summary from intermediate round

According to feedback from companies, Ericsson's CRs are agreeable in principle.

One company provided the comment to move the notes in Table, i.e., NOTEx: NR configurations including BCSs for FR1 and FR2 are defined in the tables for FR1-FR2 carrier aggregation in section 5.5A, to some general section or sub-section of TS 38.101-3 to avoid the redundancy. In moderator view, it is reasonable.

Based on the feedback until now, the moderator would like to recommend the following conclusion:

CRs (RP-210741, RP-210742, and RP-210772) can be approved with modification of moving note for NR configurations to a general part of TS38.101-3.

Proponent are encouraged to provide revised CRs for review. If no comment was received by 17:00 UTC Thursday 25th March, then proponent can upload the formal versions.

4 Final round

No open issue was discussed in final round. The revised CRs were reviewed by group and could be approved.

5 References

- [1] RP-210665, "FR1-FR2 BCS ambiguity in 38.101-3", Ericsson, RAN#91-e, 16 -26, March, 2021.
- [2] RP-210666, "CR 38.101-3 correcting FR1-FR2 BCS ambiguity – Interpretation A", Ericsson, RAN#91-e, 16 -26, March, 2021.
- [3] RP-210667, "CR 38.101-3 correcting FR1-FR2 BCS ambiguity – Interpretation B", Ericsson, RAN#91-e, 16 -26, March, 2021.