3GPP TSG-RAN WG2 Meeting #127bis R2-240xxxx

Hefei, China, 14th – 29th October, 2024

**Agenda item: 7.25.1**

**Source: ZTE**

**Title: Report of [Post127bis][011][less5MHz] 331 CR (ZTE)**

**WID/SID: NR\_FR1\_lessthan\_5MHz\_BW-Core**

**Document for: Discussion and Decision**

# Introduction

This is the report for the following offline:

* [POST127bis][011][less5MHz] 331 CR (ZTE)

 Intended outcome:

 To discuss at least the below detail issues:

Issue 1: Whether and how to indicate supporting 3M with the FSPC level?

 Method 1: Extend the supportedBandwidthDL/UL

 Method 2: Add an indication for a 3M bandwidth (e.g. similar to the channelBW-90mhz)

 Method 3: The 3M would be determined based on the BCS of each BC for the CA/DC, for the single CC, it would be determined by the support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18, For the BCS5, extend the supportedMinBandwidthDL/UL-r17 to include 3 MHz

Issue 2: Whether to indicate the 3M in the channelBWs-DL/UL?

Issue 3: Whether to dummy the support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18?

 Deadline: 2024.11.04 10:00 PCT

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# Background

In this chapter, we’d like to provide the progress of RAN2 and RAN4 for the discussion convenience.

***RAN2’s progress***

[R2-2408399](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_127b%5CDocs%5CR2-2408399.zip) Consideration on Supporting 3M Channel Bandwidth ZTE Corporation discussion Rel-18 NR\_FR1\_lessthan\_5MHz\_BW-Core

* Option 1: Only consider the single CC case and add the exceptional description to Note of the field description of the channelBWs-DL/UL;*

* Option 2: Introduce new per FSPC level capability or extend the supportedMinBandwidthDL/UL to include 3M.*

- Samsung and Qualcomm would prefer option 2, but since it is not agreable we can go with option 1. Tmobile thinks that option 2 is the way to go and it should be done in a clean way.

- Samsung and ZTE are a bit concerned as we don’t know what RAN4 is going to agree so it is risky to go with option 2.

* Noted

[R2-2408400](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_127b%5CDocs%5CR2-2408400.zip) Clarification on the Channel Bandwidth for the 3M ZTE Corporation CR Rel-18 38.306 18.3.0 1169 - F NR\_FR1\_lessthan\_5MHz\_BW-Core

- Ericsson thinks that this makes some sense and we made the wrong decision for Rel-18 so we have to be careful for R19,

* Continue in offline discussion
* [AT127bis][11][less5MHz] 331 CR (ZTE)

 Intended outcome: discuss option 1 vs. option 2. Review and agree to CR by email

 Deadline: 10-17-24

[R2-2409397](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_127b%5CDocs%5CR2-2409397.zip) Report of [AT127bis][011][less5MHz] 331 CR (ZTE) ZTE discussion Rel-18 NR\_FR1\_lessthan\_5MHz\_BW-Core

* Noted

Agreements

1: For 3M channel bandwidth, both the CA/DC and single CC case would be considered from the Rel18.

* [POST127bis][011][less5MHz] 331 CR (ZTE)

 Intended outcome:

 To discuss at least the below detail issues:

Issue 1: Whether and how to indicate supporting 3M with the FSPC level?

 Method 1: Extend the supportedBandwidthDL/UL

 Method 2: Add an indication for a 3M bandwidth (e.g. similar to the channelBW-90mhz)

 Method 3: The 3M would be determined based on the BCS of each BC for the CA/DC, for the single CC, it would be determined by the support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18, For the BCS5, extend the supportedMinBandwidthDL/UL-r17 to include 3 MHz

Issue 2: Whether to indicate the 3M in the channelBWs-DL/UL?

Issue 3: Whether to dummy the support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18?

 Deadline: long

***RAN4’s progress***

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| [**R4-2417192**](http://10.10.10.10/ftp/RAN/RAN4/Inbox/R4-2417192.zip) **WF on NR channel BW less than 5MHz** *Type: other For: Approval Source: Intel***Decision: Approved.**[**R4-2417119**](http://10.10.10.10/ftp/RAN/RAN4/Inbox/R4-2417119.zip) **LS on NR channel BW less than 5MHz** *Type: other For: Approval Source: Intel**To RAN2***Decision: Approved.** |

As approved in the RAN4’s LS [1]

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| RAN4 has had extensive discussions on the UE RF requirements for Rel-19 less than 5MHz UE configured with CA and DC band combinations. RAN4 reached consensus on the associated UE capability signalling aspects as provided below:

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| * UE needs to be able to indicate for each carrier in the CA/DC band combination whether it supports less than 5 MHz channel bandwidth operation for DL/UL
	+ To declare the support of less than 5 MHz bandwidth operation in the CA/DC band combination UE needs to indicate UE capabilities defined for NR < 5MHz channel bandwidth in Rel-18 and the existing UE capability applicability restriction to single carrier needs to be removed.
	+ UE also indicates BCS including support of less than 5MHz channel bandwidth
* For BCS signalling the following framework is used:
	+ Traditional BCSs (i.e., not BCS4 or BCS5): UE is expected to support 3MHz channel bandwidth in the band in the band combination if it indicates a corresponding BCS, which includes 3MHz channel bandwidth in RAN4 specifications. No signalling changes are expected by RAN4.
	+ BCS4: if UE indicates support for BCS4 including a band that it also supports 3 MHz channel bandwidth for, then it shall support 3 MHz for CA for that band in the band combination. No signalling changes are expected by RAN4.
	+ BCS5: if UE indicates support for BCS5 and minimum channel bandwidth of 3MHz as a part of BCS signalling, then it shall support 3 MHz for CA for that band in the combination. The existing BCS5 signalling framework needs to be modified to allow indication of 3 MHz as minimum channel bandwidth.
* It should be possible for UE to indicate support of CA/DC with less than 5MHz channel bandwidth starting from Rel-18 (i.e., allow early implementation from Rel-18)
* RAN4 has not identified a need for new signaling element. The signalling details are up to RAN2.
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The specific UE feature groups for NR less than 5 MHz channel bandwidth, which have single carrier restriction are listed below:* *support12PRB-CORESET0-r18*
* *support3MHz-ChannelBW-Asymmetric-r18*
* *support3MHz-ChannelBW-Symmetric-r18*
* *support5MHz-ChannelBW-20PRB-CORESET0-r18*
* *support12PRB-CORESET0-GSCN-41637-r18*
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In the current spec, the related capabilities are defined as below: (The related RAN1 Feature list was also copied in the Annex 6.1)

-- R1 51-1: Support for 3 MHz symmetric channel bandwidth in DL and UL

 support3MHz-ChannelBW-Symmetric-r18 ENUMERATED {supported} OPTIONAL,

 -- R1 51-1a: Support for 3 MHz channel bandwidth in uplink with larger than 3 MHz channel BW in DL support3MHz-ChannelBW-Asymmetric-r18 ENUMERATED {supported} OPTIONAL,

 -- R1 51-2a: support 12 PRB CORESET0

support12PRB-CORESET0-r18 ENUMERATED {supported} OPTIONAL,

-- R1 51-2b: Support 12 PRB CORESET0 with an associated SS/PBCH block located at GSCN 41637

support12PRB-CORESET0-GSCN-41637-r18 ENUMERATED {supported} OPTIONAL,

 -- R1 51-3: Support 5 MHz channel bandwidth with 20 PRB CORESET0

support5MHz-ChannelBW-20PRB-CORESET0-r18 ENUMERATED {supported} OPTIONAL

| ***support12PRB-CORESET0-r18***Indicates whether the UE supports reception of 12 PRB CORESET0 with an associated SS/PBCH block that is located according to Table 5.4.3.1-2 in TS 38.101-1 [2].A UE supporting this feature shall also indicate support of *support3MHz-ChannelBW-Symmetric-r18*.This feature is supported for 15kHz SCS only.This feature is only applicable to single-carrier operation.This feature is not applicable to UEs indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*.NOTE: The UE supporting this capability supports configuration of 12 PRB BWP operation. | Band | No | FDD only | FR1 only |
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| ***support5MHz-ChannelBW-20PRB-CORESET0-r18***Indicates whether the UE supports short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS, and the reception of 20 PRB CORESET0. This feature is supported for 15 kHz SCS only.This feature is only applicable when an associated SS/PBCH block is located in band n100 at GSCN 41638 of Table 5.4.3.1-3 in TS 38.101-1 [2].This feature is only applicable to single-carrier operation.This feature is not applicable to UEs indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*.NOTE: The UE supporting this feature supports configuration of 20 PRB BWP operation. | UE | No | FDD only | FR1 only |
| ***support12PRB-CORESET0-GSCN-41637-r18***Indicates whether the UE supports reception of 12 PRB CORESET0 with an associated SS/PBCH block located at GSCN 41637.A UE supporting this feature shall also indicate support of *support3MHz-ChannelBW-Symmetric-r18*. This feature is supported for 15 kHz SCS only.This feature is only applicable when an associated SS/PBCH block is located in band n100 at GSCN 41637 of Table 5.4.3.1-3 in TS 38.101-1 [2].NOTE: The UE supporting this FG supports configuration of 12 PRB BWP operation.This feature is only applicable to single-carrier operation.This feature is not applicable to UEs indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*. | UE | No | FDD only | FR1 only |
| ***support3MHz-ChannelBW-Asymmetric-r18***Indicates whether the UE supports 3 MHz channel bandwidth in uplink with larger than 3 MHz channel BW in DL, including short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS.This feature is supported for 15kHz SCS only. It is applicable only to single-carrier operation and applies to bands where the UE indicates support for *asymmetricBandwidthCombinationSet* with 3 MHz UL according to clause 5.3.6 of TS 38.101-1 [2].This feature is not applicable to UEs indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*.NOTE 1: The UE supporting this feature supports configuration of 15 PRB UL BWP operation.NOTE 2: If the UE indicates support in *asymmetricBandwidthCombinationSet* for a 3MHz UL in a band according to clause 5.3.6 of 38.101-1 [2], this feature shall be indicated for the band. | Band | No | FDD only | FR1 only |
| ***support3MHz-ChannelBW-Symmetric-r18***Indicates whether the UE supports 3 MHz symmetric channel bandwidth in DL and UL, including the following functional components:*-* Reception of 12 PRB PBCH based on RB-level puncturing;*-* Short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS;*-* Reception of 15 PRB CORESET0.This feature is supported for 15kHz SCS only. It is applicable only to single-carrier operation and when an associated SS/PBCH block is located according to Table 5.4.3.3-2 in TS 38.101-1 [2].This feature is not applicable to UEs indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*.NOTE: The UE supporting this capability supports configuration of 15 PRB BWP operation in DL and UL. | Band | No | FDD only | FR1 only |

# Discussions

## supportedBandwidthDL/UL (Per FSPC Level)

**Issue 1: Whether and how to indicate supporting 3M with the FSPC level?**

* Method 1: Extend the *supportedBandwidthDL/UL*
* Method 2: Add an indication for a 3M bandwidth (e.g. similar to the channelBW-90mhz)
* Method 3: The 3M would be determined based on the BCS of each BC for the CA/DC together with (*support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18*), for the single CC, it would be determined by the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18. For the BCS5, extend the supportedMinBandwidthDL/UL-r17 to include 3M.*

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| FeatureSetUplinkPerCC ::= SEQUENCE { supportedSubcarrierSpacingUL SubcarrierSpacing,  supportedBandwidthUL SupportedBandwidth,  channelBW-90mhz ENUMERATED {supported} OPTIONAL, |

***Method 1***

For the method 1, the problem is that the current *supportedBandwidthDL/UL*is used to indicate the maximum bandwidth, then for a CC, if the UE supported maximum bandwidth is larger than the 3M, the UE will not report 3M with *supportedBandwidthDL/UL*, at last whether it supports the 3M would still be determined by the per band capabilities.

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| ***supportedBandwidthUL, supportedBandwidthUL-v1710, supportedBandwidthUL-v1780***Indicates maximum UL channel bandwidth supported for a given SCS that UE supports within a single CC (and in case of DAPS handover for the source or target cell), which is defined in Table 5.3.5-1 in TS 38.101-1 [2] for FR1 and Table 5.3.5-1 in TS 38.101-2 [3] for FR2.For FR1, all the bandwidths listed in TS 38.101-1 [2], Table 5.3.5-1 for each band shall be mandatory with a single CC unless indicated optional. |

The method 1 would only work for the case that the supported maximum bandwidth is 3M, however according to the latest 38101-1(Table 5.3.5-1 in Annex 3), except band n106, the other bands that support 3M can also support some other larger change bandwidth.

***Method 2***

The advantage of the option 2 is that it can be used for both the Single CC and DC/CA case. But it may conflict with the RAN4’s agreement

***Method 3***

The advantage of the option 3 is that it doesn’t need to introduce new signalling, the disadvantage is that it the different solutions are adopted for the Single CC and DC/CA case.

During the offline discussion, one company pointed out that in the legacy the 5M is also the minimum one, and the 5M is still included in the *supportedBandwidthDL/UL.* Some companies also pointed out that there are cases that only 3MHz was supported as the maximum one (at least for the band n106). Thus in the first question, we’d like to see whether companies agree to go with the method 1.

**Q 1: Do you agree to extend *supportedBandwidthDL/UL to include 3MHz?***

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| **Company** | **Agree or not** | **Comment (potential clarifications etc...)** |
| ZTE | Agree | During offline discussion, we see almost all of the companies agree to extend supportedBandwidthDL/UL to include 3MHz. The logic is that:* If the maximum bandwidth is 3M, the UE can report supportedBandwidthDL/UL(-v18xy) with 3M
* If the maximum bandwidth is larger than 3M, the UE can report supportedBandwidthDL/UL(-v18xy) with the other (larger) value , and NW determine whether the 3M was supported based on the per band and/or BCS capabilities.

The Asn.1 coding could be FeatureSetDownlinkPerCC-v18xy ::= SEQUENCE { supportedBandwidthDL-v18xy SupportedBandwidth-v18xy OPTIONAL}SupportedBandwidth-v18xy ::= CHOICE { fr1-r17 ENUMERATED {mhz3, mhz5, mhz10, mhz15, mhz20, mhz25, mhz30, mhz35, mhz40, mhz45, mhz50, mhz60, mhz70, mhz80, mhz90, mhz100}, fr2-r17 ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz800, mhz1600, mhz2000}}How to include per band capability can be further discussed in the Q2. |
| Nokia | Agree | It seems this is needed at least for any band combination involving n106, including the single CC case (since UE still must indicate supported single CC band combination capabilities using the feature set signalling).  |
| Erisson | Agree | Prefer to follow same principles as we have tried to follow earlier. (A minor ASN.1 optimization, the SupportedBandwidth-v18xy need in principle only list the mhz3 value (since UE anyway indicates other max bandwidths with existing fields.)[ZTE\_Wenting]Thanks Hakan, we will go with this way in the draft CR, e.g.supportedBandwidth-v18xy ENUMERATED {mhz3,spare} OPTIONAL |
| CATT | No | We suggest to go with method 2, but not a single indication for 3MHz, we need to add the following three UE capabilities in FSPC level for provide a complete UE capability description for less than 5MHz:* *support12PRB-CORESET0-r18*
* *support3MHz-ChannelBW-Asymmetric-r18*
* *support3MHz-ChannelBW-Symmetric-r18*

[Rapp] The current per FSPC level capabilities are for the UL and DL separately, but the “support3MHz-ChannelBW-Asymmetric-r18, support3MHz-ChannelBW-Symmetric-r18” indicates both the UL and DL information, thus it’s quite different from the current per FSPC level capabilities.Then for the option 2, it means that both the newly added 3M indication and the legacy supportedBandwidthDL/UL would be considered. Then for the n106(the maximum supported bandwidth is 3M according to the Table 5.3.5-1 of 38101-1), we may need some clarification that the legacy supportedBandwidthDL/UL would not be used for this band. |
| Huawei, HiSilicon | Agree | Considering the UE may support 3MHz as the only supported channel bandwidth for a CC in a band combination, it is more future-proof to include 3MHz in supportedBandwidthDL/UL. For method2, since supportedBandwidthDL/UL is a mandatory field in 38.331, 5MHz will be included in supportedBandwidthDL/UL if the UE supports 3MHz for a CC. Assuming there is the case that 3MHz and 5MHz are both supported for a band in perband level, while 5MHz is supported for a CC of the band in a band combination, but not supported for another CC of the band in the band combination, the UE cannot signal this case.  |

**Summary: 4 companies agree with “extend *supportedBandwidthDL/UL to include 3MHz*”, while one company prefer to go to the option 2. The main problem for the option 2 is that “for the n106 (the maximum supported bandwidth is 3M according to the Table 5.3.5-1 of 38101-1), we may need some clarification that the legacy supportedBandwidthDL/UL (which is mandatory to report) would not be used for this band”.**

**Proposal 1: Extend the *supportedBandwidthDL/UL to include 3MHz.***

## channelBWs-DL/UL (Per Band Level)

**Issue 2: Whether to indicate the 3M in the channelBWs-DL/UL?**

**Issue 3: Whether to dummy the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18?***

Since the Issue 2 and 3 are all about the per band capabilities, we’d like to discuss them together. According to the offline discussion, there are 2 options:

* Option 1: Indicate the 3M in the channelBWs-DL/UL (with the reserving bit) and dummy the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18;*
* Option 2: Do not indicate the 3M in the channelBWs-DL/UL but keep the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18;*

Note: Here, we don’t give the third option (i.e. Indicate the 3M in the channelBWs-DL/UL and keep the support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18), the main reason is that it would introduce much complex work, e.g. to clarify the relationship between these two capability types)

* ***Option 1***

For the option 1, the main concern is about how to include additional information (besides the bandwidth) in the field description of “*channelBWs-DL/UL*”.

| ***Support3MHz-ChannelBW-Asymmetric-r18***Indicates whether the UE supports 3 MHz channel bandwidth in uplink with larger than 3 MHz channel BW in DL, including short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS.This feature is supported for 15kHz SCS only. It is applicable only to single-carrier operation and applies to bands where the UE indicates support for *asymmetricBandwidthCombinationSet* with 3 MHz UL according to clause 5.3.6 of TS 38.101-1 [2].This feature is not applicable to Ues indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*.NOTE 1: The UE supporting this feature supports configuration of 15 PRB UL BWP operation.NOTE 2: If the UE indicates support in *asymmetricBandwidthCombinationSet* for a 3MHz UL in a band according to clause 5.3.6 of 38.101-1 [2], this feature shall be indicated for the band. | Band | No | FDD only | FR1 only |
| --- | --- | --- | --- | --- |
| ***support3MHz-ChannelBW-Symmetric-r18***Indicates whether the UE supports 3 MHz symmetric channel bandwidth in DL and UL, including the following functional components:*-* Reception of 12 PRB PBCH based on RB-level puncturing;*-* Short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS;*-* Reception of 15 PRB CORESET0.This feature is supported for 15kHz SCS only. It is applicable only to single-carrier operation and when an associated SS/PBCH block is located according to Table 5.4.3.3-2 in TS 38.101-1 [2].This feature is not applicable to Ues indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*.NOTE: The UE supporting this capability supports configuration of 15 PRB BWP operation in DL and UL. | Band | No | FDD only | FR1 only |

The other issue is about the different mandatory types, the *channelBWs-DL/*UL is for the IOT test, which is mandatory with capability signalling, while the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18* is optional with capability signalling.

The advantage of option 1 is that it can use the legacy method to determine the bandwidth, which can reduce the NW’s processing complexity. If go to the option 1, besides dummy the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18,* the spec impact to the *channelBWs-DL/*UL maybe as below: (the wording can be further polished if the option 1 was agreed)

| ***channelBWs-DL***/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*omit the unchaged part\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/For FR1, the leading/leftmost bit in *channelBWs-DL-v1590* indicates 70MHz, the second leftmost bit indicates 45MHz, the third leftmost bit indicates 35MHz, the fourth leftmost bit indicates 100MHz, the fifth leftmost bit indicates 3MHz and all the remaining bits in *channelBWs-DL-v1590* shall be set to 0. The fourth leftmost bit (for 100MHz) is not applicable for bands n41, n48, n77, n78, n79 and n90 as defined in TS 38.101-1 [2]. For each band, €RedCap Ues shall indicate supporting the maximum of those channel bandwidths that are less than or equal to 20 MHz for FR1 and less than or equal to 100 Mhz for FR2, taking restrictions in TS 38.101-1 [2] and TS 38.101-2 [3] into consideration. For each band, NTN capable Ues shall indicate the supported channel bandwidths for FR1, taking restrictions in TS 38.101-5 [34] into consideration.This feature is applicable only for FR1 and FR2-1 band, otherwise it is absent.NOTE 1: To determine whether the UE supports a specific SCS for a given band, the network validates the *supportedSubCarrierSpacingDL* and the *scs-60kHz*.To determine whether the UE supports a channel bandwidth of 90 MHz for the band combination with other bandwidth combination set than BCS5, the network may ignore this capability and validate instead the *channelBW-90mhz*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, and *supportedBandwidthCombinationSetIntraENDC-v1790*. To determine whether the UE supports a channel bandwidth of 90 MHz for the band combination with BCS5, the network may ignore this capability and validate instead the *channelBW-90mhz*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, *supportedAggBW-FR1-r17*, and *supportedBandwidthCombinationSetIntraENDC-v1790*. To determine whether the UE supports a channel bandwidth of 400 MHz, the network may ignore this capability and validate the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *supportedBandwidthDL*, and *supportedBandwidthCombinationSetIntraENDC-v1790*.For serving cell(s) with other channel bandwidths:- If *supportedAggBW-FR1-r17* is reported, the network validates the *channelBWs-DL*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]), *supportedBandwidthDL-v1780*, *supportedMinBandwidthDL*, *supportedAggBW-FR1-r17*, and *supportedBandwidthCombinationSetIntraENDC-v1790.*- Otherwise, the network validates the *channelBWs-DL*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]), *supportedBandwidthDL/supportedBandwidthDL-v1710,* *supportedMinBandwidthDL*, *supportedAggBW-FR2-r17*, and *supportedBandwidthCombinationSetIntraENDC-v1790.*NOTE 2: If the 3M was determined as supported in both UL and DL, the UE supports symmetric 3M feature, the symmetric 3M feature indicates the following functional components: *-* Reception of 12 PRB PBCH based on RB-level puncturing; *-* Short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS; *-* Reception of 15 PRB CORESET0. The symmetric 3M feature is supported for 15kHz SCS on FDD FR1 band only. It is applicable to both single-carrier and CA/DC operation and when an associated SS/PBCH block is located according to Table 5.4.3.3-2 in TS 38.101-1 [2]. The symmetric 3M feature is not applicable to Ues indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*. The UE supporting the symmetric 3M feature supports configuration of 15 PRB BWP operation in DL and UL.NOTE 3: If the 3M was determined as supported in UL and the corresponding asymmetric bandwidth combination was supported according to the *asymmetricBandwidthCombinationSet*, the UE supports asymmetric 3M feature, including short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS. The asymmetric 3M feature is supported for 15kHz SCS on FDD FR1 band only. It is applicable to both single-carrier and CA/DC operation. This feature is not applicable to Ues indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*. The UE supporting this feature supports configuration of 15 PRB UL BWP operation.  |
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* ***Option 2***

For the option 2 (Do not indicate the 3M in the channelBWs-DL/UL but keep the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18*), the network has to adopt some special processing for the 3M, the spec impact would as below for the *channelBWs-DL*, the UL may take the similar modification. (The wording can be further polished if the option 1 was agreed)

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| ***channelBWs-DL***/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*omit the unchaged part\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/NOTE: To determine whether the UE supports a specific SCS for a given band, the network validates the *supportedSubCarrierSpacingDL* and the *scs-60kHz*.To determine whether the UE supports a channel bandwidth of 90 MHz for the band combination with other bandwidth combination set than BCS5, the network may ignore this capability and validate instead the *channelBW-90mhz*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, and *supportedBandwidthCombinationSetIntraENDC-v1790*. To determine whether the UE supports a channel bandwidth of 90 MHz for the band combination with BCS5, the network may ignore this capability and validate instead the *channelBW-90mhz*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, *supportedAggBW-FR1-r17*, and *supportedBandwidthCombinationSetIntraENDC-v1790*. To determine whether the UE supports a channel bandwidth of 400 MHz, the network may ignore this capability and validate the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *supportedBandwidthDL*, and *supportedBandwidthCombinationSetIntraENDC-v1790*. To determine whether the UE supports a channel bandwidth of 3MHz, the network may ignore this capability and validate instead the *support3MHz-ChannelBW-Symmetric-r18,* the *supportedBandwidthCombinationSet*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]), *supportedBandwidthDL/supportedBandwidthDL-v18xy,* *supportedMinBandwidthDL*  For serving cell(s) with other channel bandwidths:- If *supportedAggBW-FR1-r17* is reported, the network validates the *channelBWs-DL*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]), *supportedBandwidthDL-v1780*, *supportedMinBandwidthDL*, *supportedAggBW-FR1-r17*, and *supportedBandwidthCombinationSetIntraENDC-v1790.*- Otherwise, the network validates the *channelBWs-DL*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]), *supportedBandwidthDL/supportedBandwidthDL-v1710,* *supportedMinBandwidthDL*, *supportedAggBW-FR2-r17*, and *supportedBandwidthCombinationSetIntraENDC-v1790.* |

According to the above analysis, the option 1 would introduce more spec modification but it can use the same logic as the other bandwidth determination at the network side, which would reduce the network side processing complexity. Meanwhile please also notice that the *channelBWs-DL/*UL is for the IOT test, which is mandatory with capability signalling, while the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18* is optional with capability signalling. If we goes to the option 1, it means that we change the type.

The option 2 would introduce less spec modification but require additional processing at the network side.

During the offline discussion, we see some companies show strong support to the option 1, now based on the above analysis, we’d like to confirm companies’ preference.

**Q2: On the per band capabilities, which option do you prefer?**

* Option 1: Indicate the 3M in the channelBWs-DL/UL (with the reserving bit) and dummy the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18;*
* Option 2: Do not indicate the 3M in the channelBWs-DL/UL but keep the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18;*

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Prefer Option 1 or 2** | **Can you accept the other option** | **Comment (potential clarifications etc…)** |
| ZTE | Option 1 | Can accept option 2 according to the above analysis | We prefer to the option 1 for that it would not introduce additional processing on the channel bandwidth determination.But we can accept the option 2 from the spec complexity and the mandatory type aspect |
| Nokia | Option 1 | Yes | Option 1 will also require some further updates to the corresponding feature groups in TR 38.822. |
| Ericsson | Option 1  | Yes, but with much less preference. |  |
| CATT | Option 2 | Yes | As 3MHz is an optional feature, we tend to keep current spec as it is, and only add specific UE capabilities for this feature without affecting other parts. |
| Huawei, HiSilicon | Option2 | No | We prefer to keep the current spec. For 3MHz, there are amounts of related features and restrictions defined by RAN4/RAN1, except for the bandwidth value itself, this is much different with other channel bandwidth. For example, the 3MHz is only for 15kHz SCS on FDD FR1 band, and not applicable for Redcap UE, and so on. We think it is cleaner to have a separate capability field to capture the necessary functionalities for 3MHz. Besides, as analysed by rapp, we should not change the mandatory type for these 3MHz capabilities. Lastly, we understand from NW perspective, the NW will anyway need to take a special handling for 3MHz case.  |

**Summary: 3 companies prefer to go the option 1 while 2 companies prefer to go the option 2. Furthermore 4 companies can accept both solutions, while 1 company can only accept option 2. Considering the spec complexity and also the mandatory type aspect, let’s try to go with option 2 if there is no strong objections.**

**Proposal 2: On the per band capabilities, considering the different mandatory types and the spec complexity, the options 2 would be taken as the baseline for the potential CR.**

* Option 2: Do not indicate the 3M in the channelBWs-DL/UL but keep the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18;*

## Other

There are 2 other issues that can be further discussed:

***Issue 1: The supportedMinBandwidthDL/UL-r17* for the BCS 5.**

According to the RAN4’s LS, it also suggests to include 3M for the minimum channel bandwidth indication.

|  |
| --- |
| * + BCS5: if UE indicates support for BCS5 and minimum channel bandwidth of 3MHz as a part of BCS ignaling, then it shall support 3 MHz for CA for that band in the combination. The existing BCS5 signalling framework needs to be modified to allow indication of 3 MHz as minimum channel bandwidth.
 |

| ***supportedMinBandwidthDL-r17*** Indicates minimum DL channel bandwidth supported for a given SCS that UE supports within a single CC (and in case of intra-frequency DAPS handover for the source and target cells), which is defined in Table 5.3.5-1 in TS 38.101-1 [2] for FR1 and Table 5.3.5-1 in TS 38.101-2 [3] for FR2. This parameter is only applicable to the Bandwidth Combination Set 5 (BCS5). The UE shall indicate this parameter for at least one CC of a BCS5 band combination. This field does not restrict the bandwidths configured for a single CC (i.e. non-CA case). | FSPC | CY | N/A | N/A |
| --- | --- | --- | --- | --- |
| ***supportedMinBandwidthUL-r17*** Indicates minimum UL channel bandwidth supported for a given SCS that UE supports within a single CC (and in case of intra-frequency DAPS handover for the source and target cells), which is defined in Table 5.3.5-1 in TS 38.101-1 [2] for FR1 and Table 5.3.5-1 in TS 38.101-2 [3] for FR2. This parameter is only applicable to the Bandwidth Combination Set 5 (BCS5). The UE shall indicate this parameter for at least one CC of a BCS5 band combination. This field does not restrict the bandwidths configured for a single CC (i.e. non-CA case). | FSPC | CY | N/A | N/A |

**Q 3: Do you agree to extend *supportedMinBandwidthDL/UL-r17* to include 3MHz?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not** | **Comment (potential clarifications etc..)** |
| ZTE | Agree | In the current spec, the min ***supportedMinBandwidthDL/UL-r17*** is 5M, we need to extend it to support 5M, e.g. FeatureSetDownlinkPerCC-v18xy ::= SEQUENCE { supportedminBandwidthDL-v18xy SupportedBandwidth-v18xy OPTIONAL}SupportedBandwidth-v18xy ::= CHOICE {fr1-r17 ENUMERATED {mhz3, mhz5, mhz10, mhz15, mhz20, mhz25, mhz30, mhz35, mhz40, mhz45, mhz50, mhz60, mhz70, mhz80, mhz90, mhz100},fr2-r17 ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz800, mhz1600, mhz2000}} |
| Nokia | Agree |  |
| Ericsson | Agree |  |
| CATT | Agree |  |
| Huawei, HiSilicon | Agree |  |

**Proposal 3: Extend *supportedMinBandwidthDL/UL-r17* to include 3MHz**

***Issue 2: The Other 3M related capabilities***

There are also the other 3 capabilities, in which 2 are about the 12PRB while the third one is about the 20 PRB for the band 100.

| ***support12PRB-CORESET0-r18***Indicates whether the UE supports reception of 12 PRB CORESET0 with an associated SS/PBCH block that is located according to Table 5.4.3.1-2 in TS 38.101-1 [2].A UE supporting this feature shall also indicate support of *support3MHz-ChannelBW-Symmetric-r18*.This feature is supported for 15kHz SCS only.This feature is only applicable to single-carrier operation.This feature is not applicable to UEs indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*.NOTE: The UE supporting this capability supports configuration of 12 PRB BWP operation. | Band | No | FDD only | FR1 only |
| --- | --- | --- | --- | --- |
| ***support12PRB-CORESET0-GSCN-41637-r18***Indicates whether the UE supports reception of 12 PRB CORESET0 with an associated SS/PBCH block located at GSCN 41637.A UE supporting this feature shall also indicate support of *support3MHz-ChannelBW-Symmetric-r18*. This feature is supported for 15 kHz SCS only.This feature is only applicable when an associated SS/PBCH block is located in band n100 at GSCN 41637 of Table 5.4.3.1-3 in TS 38.101-1 [2].NOTE: The UE supporting this FG supports configuration of 12 PRB BWP operation.This feature is only applicable to single-carrier operation.This feature is not applicable to UEs indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*. | UE | No | FDD only | FR1 only |
| ***support5MHz-ChannelBW-20PRB-CORESET0-r18***Indicates whether the UE supports short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS, and the reception of 20 PRB CORESET0. This feature is supported for 15 kHz SCS only.This feature is only applicable when an associated SS/PBCH block is located in band n100 at GSCN 41638 of Table 5.4.3.1-3 in TS 38.101-1 [2].This feature is only applicable to single-carrier operation.This feature is not applicable to UEs indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*.NOTE: The UE supporting this feature supports configuration of 20 PRB BWP operation. | UE | No | FDD only | FR1 only |

For the two 12 PRB capabilities: *support12PRB-CORESET0-r18* (per band)/ *support12PRB-CORESET0-GSCN-41637-r18* (per UE, only for the band 100 with GSCN 41637), obviously, the *support12PRB-CORESET0-GSCN-41637-r18* can be reported by the *support12PRB-CORESET0-r18. Thus, the support12PRB-CORESET0-GSCN-41637-r18* can be dummified, otherwise, there are overlap between these 2 capabilities for the band 100. The spec impact can be as below:

| ***support12PRB-CORESET0-r18***Indicates whether the UE supports reception of 12 PRB CORESET0 with an associated SS/PBCH block that is located according to Table 5.4.3.1-2 and Table 5.4.3.1-3 in TS 38.101-1 [2].A UE supporting this feature shall also indicate support of *~~support3MHz-ChannelBW-Symmetric-r18~~* *symmetric 3M feature as in the channelBWs-DL/UL*.This feature is supported for 15kHz SCS only.~~This feature is only applicable to single-carrier operation~~.This feature is not applicable to UEs indicating *supportOfRedCap-r17* or *supportOfERedCap-r18*.NOTE: The UE supporting this capability supports configuration of 12 PRB BWP operation. | Band | No | FDD only | FR1 only |
| --- | --- | --- | --- | --- |
| ***~~support12PRB-CORESET0-GSCN-41637-r18~~***~~Indicates whether the UE supports reception of 12 PRB CORESET0 with an associated SS/PBCH block located at GSCN 41637.~~~~A UE supporting this feature shall also indicate support of~~ *~~support3MHz-ChannelBW-Symmetric-r18~~*~~. This feature is supported for 15 kHz SCS only.~~~~This feature is only applicable when an associated SS/PBCH block is located in band n100 at GSCN 41637 of Table 5.4.3.1-3 in TS 38.101-1 [2].~~~~NOTE: The UE supporting this FG supports configuration of 12 PRB BWP operation.~~~~This feature is only applicable to single-carrier operation.~~~~This feature is not applicable to UEs indicating~~ *~~supportOfRedCap-r17~~* ~~or~~ *~~supportOfERedCap-r18~~*~~.~~ | ~~UE~~ | ~~No~~ | ~~FDD only~~ | ~~FR1 only~~ |

**Q 4: Do you agree to dummy the *support12PRB-CORESET0-GSCN-41637-r18*?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not** | **Comment (potential clarifications etc...)** |
| ZTE | Agree |  |
| Nokia | Disagree | n100 was a special case discussed extensively in RAN1, where they decided to split this feature for the case with GSCN 41637. Specifically, the synchronization raster points used for n100 with GSCN 41637 (Table 5.4.3.1-3 in TS 38.101-1) are different than the sync raster points that are applicable for any other GSCN for n100 (Table 5.4.3.1-2). In our understanding, a UE may support the sync raster points in n100 according to one or both of the tables: some UEs could support both types of configurations while others may only support one configuration. However these cases cannot be differentiated if the capabilities are combined. [ZTE\_Wenting] According to our internal discussion, the “support12PRB-CORSET0” feature is only supported with GSCN 41637. However we can accept the majorities’ views on it.  |
| Ericsson | Disagree | Same view as Nokia, seems safe to keep. |
| CATT | Disagree | This is from RAN1 feature list, and we believe there is a reason for RAN1 to differentiate GSCN-41637 from other GSCN parameters. |
| Huawei, HiSilicon | Disagree | We should follow RAN1 agreements. |

**Summary: For that most companies prefer to keep the *support12PRB-CORESET0-r18* and the *support12PRB-CORESET0-GSCN-41637-r18* as it is, we don’t think any proposal is needed for this question.**

**Q 5: Do you have any other issues that need to be further discussed**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not** | **Comment (potential clarifications etc...)** |
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# Conclusion

**Proposal 1: Extend the *supportedBandwidthDL/UL to include 3MHz.***

**Proposal 2: On the per band capabilities, considering the different mandatory types and the spec complexity, the options 2 would be taken as the baseline for the potential CR.**

* Option 2: Do not indicate the 3M in the channelBWs-DL/UL but keep the *support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18;*

**Proposal 3: Extend *supportedMinBandwidthDL/UL-r17* to include 3MHz**

# Reference

1. [R4-2417119](http://10.10.10.10/ftp/RAN/RAN4/Inbox/R4-2417119.zip) LS on NR channel BW less than 5MHz Source: Intel

# Annex

## Annex 1：NR\_FR1\_lessthan\_5MHz\_BW

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 (Sidelink 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 |
| 51. NR\_FR1\_lessthan\_5MHz\_BW | 51-1 | Support for 3 MHz symmetric channel bandwidth in DL and UL | 1) Reception of 12 PRB PBCH based on RB-level puncturing2) Short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS3) Reception of 15 PRB CORESET0 |  | Yes | N/A | UE is not able to support 3 MHz symmetric channel bandwidth | Per Band | FDD only | FR1 only | N/A | This FG is supported for 15 kHz SCS onlyThis FG is applicable only when an associated SS/PBCH block is located according to Table 5.4.3.3-2 in TS 38.101-1 in Rel-18Note: The UE supporting this FG supports configuration of 15 PRB BWP operation in DL and ULThis FG is only applicable to single-carrier operation. This FG is not applicable to UEs indicating supportOfRedCap-r17 (i.e., FG 28-1) or supportOfERedCap-r18 (i.e., FG 48-1). | Optional with capability signalling |
| 51. NR\_FR1\_lessthan\_5MHz\_BW | 51-1a | Support for 3 MHz channel bandwidth in uplink with larger than 3 MHz channel BW in DL | 1) Short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS |  | Yes | N/A | UE is not able to support 3 MHz channel bandwidth in uplink with larger than 3 MHz channel BW in DL. | Per band | FDD only | FR1 only | N/A | This FG is supported for 15 kHz SCS onlyNote: This FG applies to bands where the UE indicates support for asymmetricBandwidthCombinationSet with 3 MHz UL according to subclause 5.3.6 of 38.101-1Note: if the UE indicates support in asymmetricBandwidthCombinationSet for a 3 MHz UL in a band according to subclause 5.3.6 of 38.101-1, this FG shall be indicated for the bandNote: The UE supporting this FG supports configuration of 15 PRB UL BWP operationThis FG is only applicable to single-carrier operation. This FG is not applicable to UEs indicating supportOfRedCap-r17 (i.e., FG 28-1) or supportOfERedCap-r18 (i.e., FG 48-1). | Optional with capability signalling |
| 51. NR\_FR1\_lessthan\_5MHz\_BW | 51-2a | Support 12 PRB CORESET0 | 1) Reception of 12 PRB CORESET0 with an associated SS/PBCH block that is located according to Table 5.4.3.1-2 in TS 38.101-1 | 51-1 | Yes | N/A | UE is not able to support 3 MHz channel bandwidth with 12 PRB CORESET0 | Per Band | FDD only | FR1 only | N/A | This FG is supported for 15 kHz SCS onlyNote: The UE supporting this FG supports configuration of 12 PRB BWP operationThis FG is only applicable to single-carrier operation. This FG is not applicable to UEs indicating supportOfRedCap-r17 (i.e., FG 28-1) or supportOfERedCap-r18 (i.e., FG 48-1). | Optional with capability signalling |
| 51. NR\_FR1\_lessthan\_5MHz\_BW | 51-2b | Support 12 PRB CORESET0 with an associated SS/PBCH block located at GSCN 41637 | 1) Reception of 12 PRB CORESET0 with an associated SS/PBCH block located at GSCN 41637 | 51-1 | Yes | N/A | UE is not able to support 3 MHz channel bandwidth with 12 PRB CORESET0 when an associated SS/PBCH block is located in band n100 at frequency GSCN 41637 of Table 5.4.3.1-3 in TS 38.101-1 | Per UE | FDD only | FR1 only | N/A | This FG is supported for 15 kHz SCS onlyThis FG is only applicable when an associated SS/PBCH block is located in band n100 at GSCN 41637 of Table 5.4.3.1-3 in TS 38.101-1 in Rel-18.Note: The UE supporting this FG supports configuration of 12 PRB BWP operationThis FG is only applicable to single-carrier operation. This FG is not applicable to UEs indicating supportOfRedCap-r17 (i.e., FG 28-1) or supportOfERedCap-r18 (i.e., FG 48-1). | Optional with capability signalling |
| 51. NR\_FR1\_lessthan\_5MHz\_BW | 51-3 | Support 5 MHz channel bandwidth with 20 PRB CORESET0 | 1) Short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS2) Reception of 20 PRB CORESET0 |  | Yes | N/A | UE is not able to support 5 MHz channel bandwidth with 20 PRB CORESET0 | Per UE | FDD only | FR1 only | N/A | This FG is supported for 15 kHz SCS onlyThis FG is only applicable when an associated SS/PBCH block is located in band n100 at GSCN 41638 of Table 5.4.3.1-3 in TS 38.101-1 in Rel-18.Note: The UE supporting this FG supports configuration of 20 PRB BWP operationThis FG is only applicable to single-carrier operation. This FG is not applicable to UEs indicating supportOfRedCap-r17 (i.e., FG 28-1) or supportOfERedCap-r18 (i.e., FG 48-1). | Optional with capability signalling |

## Annex 2: Legacy Bandwidth Capabilities

* ***Per FSPC level***

| ***supportedBandwidthDL, supportedBandwidthDL-v1710, supportedBandwidthDL-v1780***Indicates maximum DL channel bandwidth supported for a given SCS that UE supports within a single CC (and in case of DAPS handover for the source or target cell), which is defined in Table 5.3.5-1 in TS 38.101-1 [2] for FR1 and Table 5.3.5-1 in TS 38.101-2 [3] for FR2.For FR1, all the bandwidths listed in TS 38.101-1 [2], Table 5.3.5-1 for each band shall be mandatory with a single CC unless indicated optional. For FR2, the set of mandatory CBW is 50, 100, 200 MHz. When this field is included in a band combination with a single band entry and a single CC entry (i.e. non-CA band combination), the UE shall indicate the maximum channel bandwidth for the band according to TS 38.101-1 [2] and TS 38.101-2 [3].For FR2, *supportedBandwidthDL-v1710* is included if the maximum DL channel bandwidth supported by the UE within a single CC is greater than 400MHz. When the *supportedBandwidthDL* and the *supportedBandwidthDL-v1710* are reported together for a CC, the network which is able to decode the *supportedBandwidthDL-v1710* ignores the *supportedBandwidthDL*.The UE may report a *supportedBandwidthDL* wider than the *channelBWs-DL*; this *supportedBandwidthDL* may not be included in the Table 5.3.5-1 of TS 38.101-1 [2]/TS 38.101-2[3] for the case that the UE is unable to report the actual supported bandwidth according to the Table 5.3.5-1 of TS 38.101-1 [2]/TS 38.101-2 [3]. For each band, (e)RedCap UEs shall indicate its maximum channel bandwidth, which is the maximum of those channel bandwidths that are less than or equal to 20 MHz for FR1 and less than or equal to 100 Mhz for FR2, taking restrictions in TS 38.101-1 [2] and TS 38.101-2 [3] into consideration.The *supportedBandwidthDL-v1780* is only applicable to Bandwidth Combination Set 5 (BCS5) of FR1 NR CA (including NR CA part of (NG)EN-DC and NE-DC) and FR1 NR-DC. If the UE reports *supportedAggBW-FR1-r17*, the UE shall report *supportedBandwidthDL-v1780*.NOTE: See the note in the field decription of *channelBWs-DL* for the determination of supported DL channel bandwidth. | FSPC | CY | N/A | N/A |
| --- | --- | --- | --- | --- |

| ***supportedBandwidthUL, supportedBandwidthUL-v1710, supportedBandwidthUL-v1780***Indicates maximum UL channel bandwidth supported for a given SCS that UE supports within a single CC (and in case of DAPS handover for the source or target cell), which is defined in Table 5.3.5-1 in TS 38.101-1 [2] for FR1 and Table 5.3.5-1 in TS 38.101-2 [3] for FR2.For FR1, all the bandwidths listed in TS 38.101-1 [2], Table 5.3.5-1 for each band shall be mandatory with a single CC unless indicated optional. For FR2, the set of mandatory CBW is 50, 100, 200 MHz. When this field is included in a band combination with a single band entry and a single CC entry (i.e. non-CA band combination), the UE shall indicate the maximum channel bandwidth for the band according to TS 38.101-1 [2] and TS 38.101-2 [3].For FR2, *supportedBandwidthUL-v1710* is included if the maximum UL channel bandwidth supported by the UE within a single CC is greater than 400MHz. When the *supportedBandwidthUL* and the *supportedBandwidthUL-v1710* are reported together for a CC, the network which is able to decode the *supportedBandwidthUL-v1710* ignores the *supportedBandwidthUL*.The UE may report a *supportedBandwidthUL* wider than the *channelBWs-UL*; this *supportedBandwidthUL* may not be included in the Table 5.3.5-1 of TS 38.101-1 [2]/TS 38.101-2 [3] for the case that the UE is unable to report the actual supported bandwidth according to the Table 5.3.5-1 of TS 38.101-1 [2]/TS 38.101-2 [3]. For each band, (e)RedCap UEs shall indicate its maximum channel bandwidth, which is the maximum of those channel bandwidths that are less than or equal to 20 MHz for FR1 and less than or equal to 100 Mhz for FR2, taking restrictions in TS 38.101-1 [2] and TS 38.101-2 [3] into consideration.The *supportedBandwidthUL-v1780* is only applicable to Bandwidth Combination Set 5 (BCS5) of FR1 NR CA (including NR CA part of (NG)EN-DC and NE-DC) and FR1 NR-DC. If the UE reports *supportedAggBW-FR1-r17*, the UE shall report *supportedBandwidthUL-v1780*.NOTE: See the note in the field decription of *channelBWs-UL* for the determination of supported UL channel bandwidth. | FSPC | CY | N/A | N/A |
| --- | --- | --- | --- | --- |

* ***Per BC level***

| ***supportedBandwidthCombinationSet***Defines the supported bandwidth combination set for a band combination as defined in TS 38.101-1 [2], TS 38.101-2 [3] and TS 38.101-3 [4]. For NR SA CA, NR-DC, inter-band (NG)EN-DC without intra-band (NG)EN-DC component, inter-band NE-DC without intra-band NE-DC component and intra-band (NG)EN-DC/NE-DC with additional inter-band NR CA component, the field defines the bandwidth combinations for the NR part of the band combination. For intra-band (NG)EN-DC/NE-DC without additional inter-band NR and LTE CA component, the field indicates the supported bandwidth combination set applicable to intra-band (NG)EN-DC/NE-DC band combination. This field is not applicable to source and target cells in intra-frequency DAPS handover.Field encoded as a bit map, where bit N is set to "1" if UE supports Bandwidth Combination Set N for this band combination as defined in the TS 38.101-1 [2], TS 38.101-2 [3] and TS 38.101-3 [4]. The leading / leftmost bit (bit 0) corresponds to the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set 1 and so on. It is mandatory if- the band combination has more than one NR carrier (at least one SCell in an NR cell group);- or is an intra-band (NG)EN-DC/NE-DC combination without additional inter-band NR and LTE CA component;- or both.The corresponding bits of Bandwidth Combination Set 4 and Bandwidth Combination Set 5 shall not both be set to "1" for the same band combination. | BC | CY | N/A | N/A |
| --- | --- | --- | --- | --- |

* ***Per Band level***

| ***channelBWs-DL***Indicates for each subcarrier spacing the UE supported channel bandwidths.Absence of the *channelBWs-DL* (without suffix) for a band or absence of specific scs-XXkHz entry for a supported subcarrier spacing means that the UE supports the channel bandwidths among [5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 100] and [50, 100, 200] that were defined in clause 5.3.5 of TS 38.101-1 version 15.7.0 [2] and TS 38.101-2 version 15.7.0 [3] for the given band or the specific SCS entry. For IAB-MT, to determine whether the IAB-MT supports a channel bandwidth of 100 MHz, the network checks c*hannelBW-DL-IAB-r16*. For NCR-MT, to determine whether the NCR-MT supports a channel bandwidth of 100 MHz, the network checks c*hannelBW-DL-NCR-r18*.For FR1, the bits in *channelBWs-DL* (without suffix) starting from the leading / leftmost bit indicate 5, 10, 15, 20, 25, 30, 40, 50, 60 and 80MHz. For FR2, the bits in *channelBWs-DL* (without suffix) starting from the leading / leftmost bit indicate 50, 100 and 200MHz. The third / rightmost bit (for 200MHz) shall be set to 1. For IAB-MT and NCR-MT, the third / rightmost bit (for 200MHz) is ignored. To determine whether the IAB-MT supports a channel bandwidth of 200 MHz, the network checks *channelBW-DL-IAB-r16*. To determine whether the NCR-MT supports a channel bandwidth of 200 MHz, the network checks c*hannelBW-DL-NCR-r18*.For FR1, the leading/leftmost bit in *channelBWs-DL-v1590* indicates 70MHz, the second leftmost bit indicates 45MHz, the third leftmost bit indicates 35MHz, the fourth leftmost bit indicates 100MHz and all the remaining bits in *channelBWs-DL-v1590* shall be set to 0. The fourth leftmost bit (for 100MHz) is not applicable for bands n41, n48, n77, n78, n79 and n90 as defined in TS 38.101-1 [2]. For each band, (e)RedCap UEs shall indicate supporting the maximum of those channel bandwidths that are less than or equal to 20 MHz for FR1 and less than or equal to 100 Mhz for FR2, taking restrictions in TS 38.101-1 [2] and TS 38.101-2 [3] into consideration. For each band, NTN capable UEs shall indicate the supported channel bandwidths for FR1, taking restrictions in TS 38.101-5 [34] into consideration.This feature is applicable only for FR1 and FR2-1 band, otherwise it is absent.NOTE: To determine whether the UE supports a specific SCS for a given band, the network validates the *supportedSubCarrierSpacingDL* and the *scs-60kHz*.To determine whether the UE supports a channel bandwidth of 90 MHz for the band combination with other bandwidth combination set than BCS5, the network may ignore this capability and validate instead the *channelBW-90mhz*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, and *supportedBandwidthCombinationSetIntraENDC-v1790*. To determine whether the UE supports a channel bandwidth of 90 MHz for the band combination with BCS5, the network may ignore this capability and validate instead the *channelBW-90mhz*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, *supportedAggBW-FR1-r17*, and *supportedBandwidthCombinationSetIntraENDC-v1790*. To determine whether the UE supports a channel bandwidth of 400 MHz, the network may ignore this capability and validate the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *supportedBandwidthDL*, and *supportedBandwidthCombinationSetIntraENDC-v1790*.For serving cell(s) with other channel bandwidths:- If *supportedAggBW-FR1-r17* is reported, the network validates the *channelBWs-DL*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]), *supportedBandwidthDL-v1780*, *supportedMinBandwidthDL*, *supportedAggBW-FR1-r17*, and *supportedBandwidthCombinationSetIntraENDC-v1790.*- Otherwise, the network validates the *channelBWs-DL*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]), *supportedBandwidthDL/supportedBandwidthDL-v1710,* *supportedMinBandwidthDL*, *supportedAggBW-FR2-r17*, and *supportedBandwidthCombinationSetIntraENDC-v1790.* | Band | Yes | N/A | N/A |
| --- | --- | --- | --- | --- |

## Annex 3: Channel Bandwidth for the NR FR1 Band

Table 5.3.5-1 Channel bandwidths for each NR band (38101-1)

|  |  |  |
| --- | --- | --- |
| NR Band | SCS (kHz) | UE Channel bandwidth (MHz) |
| 3 | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** |
| n1 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 | 45 | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 45 | 50 |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 | 45 | 50 |  |  |  |  |  |
| n2 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
| n3 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |  |  |  |  |  |
| n5 | 15 |  | 5 | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n7 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  | 50 |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  | 50 |  |  |  |  |  |
| n8 | 15 |  | 5 | 10 | 15 | 20 | 253 | 303 | 353 |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 253 | 303 | 353 |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n12 | 15 |  | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n13 | 15 |  | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n1410 | 15 |  | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n18 | 15 |  | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n20 | 15 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n24 | 15 |  | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n25 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 453 |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 453 |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 453 |  |  |  |  |  |  |
| n26 | 15 | 34 | 5 | 10 | 15 | 20 | 253 | 303 |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 253 | 303 |  |  |  |  |  |  |  |  |  |
| n28 | 15 | 34 | 5 | 10 | 15 | 207 | 257 | 307 |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 207 | 257 | 307 |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n29 | 15 |  | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n30 | 15 |  | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n31 | 15 | 3 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n34 | 15 |  | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| n3810 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n39 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
| n40 | 15 |  | 55 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| n41 | 15 |  | 54,11 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 |
| n46 | 15 |  |  | 105 |  | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
|  | 30 |  |  | 105 |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  | 1004 |
|  | 60 |  |  | 105 |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  | 1004 |
| n4710 | 15 |  |  | 10 |  | 20 |  | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 |  | 20 |  | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 |  | 20 |  | 30 |  | 40 |  |  |  |  |  |  |  |
| n48 | 15 |  | 55 | 10 | 15 | 20 |  | 30 |  | 40 |  | 506 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 506 | 606 | 706 | 806 | 906 | 1006 |
|  | 60 |  |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 506 | 606 | 706 | 806 | 906 | 1006 |
| n50 | 15 |  | 55 | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 | 60 |  | 803 |  |  |
|  | 60 |  |  | 10 | 15 | 20 |  | 30 |  | 40 |  | 50 | 60 |  | 803 |  |  |
| n51 | 15 |  | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n53 | 15 |  | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n54 | 15 |  | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n65 | 15 |  | 5 | 10 | 15 | 20 |  |  |  |  |  | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  |  |  |  |  | 50 |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 |  |  |  |  |  | 50 |  |  |  |  |  |
| n66 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |  |  |  |  |  |  |
| n67 | 15 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n70 | 15 |  | 5 | 10 | 15 | 203 | 253 |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 203 | 253 |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 203 | 253 |  |  |  |  |  |  |  |  |  |  |
| n71 | 15 |  | 5 | 10 | 15 | 20 | 2512 | 3012 | 3512 |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 2512 | 3012 | 3512 |  |  |  |  |  |  |  |  |
| n72 | 15 | 3 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n74 | 15 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
| n75 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n76 | 15 |  | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| n78 | 15 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| n7910 | 15 |  |  | 10 |  | 20 |  | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 |  | 20 |  | 30 |  | 40 |  | 50 | 60 | 704 | 80 | 90 | 100 |
|  | 60 |  |  | 10 |  | 20 |  | 30 |  | 40 |  | 50 | 60 | 704 | 80 | 90 | 100 |
| n80 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  |  |  |  |  |  |  |
| n81 | 15 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n82 | 15 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n83 | 15 |  | 5 | 10 | 15 | 207 | 257 | 307 |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 207 | 257 | 307 |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n84 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n85 | 15 | 34 | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n86 | 15 |  | 5 | 10 | 15 | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
| n89 | 15 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n90 | 15 |  | 54 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 |
| n91 | 15 |  | 5 | 108 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n92 | 15 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n93 | 15 |  | 5 | 108 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n94 | 15 |  | 5 | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n95 | 15 |  | 5 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| n96 | 15 |  |  |  |  | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  | 1004 |
|  | 60 |  |  |  |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  | 1004 |
| n97 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| n98 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 15 | 20 | 25 | 30 | 35 | 40 |  |  |  |  |  |  |  |
| n99 | 15 |  | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n100 | 15 | 34 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n101 | 15 |  | 5 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n102 | 15 |  |  |  |  | 20 |  |  |  | 40 |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  | 1004 |
|  | 60 |  |  |  |  | 20 |  |  |  | 40 |  |  | 60 |  | 80 |  | 1004 |
| n104 | 15 |  |  |  |  | 20 |  | 30 |  | 40 |  | 50 |  |  |  |  |  |
|  | 30 |  |  |  |  | 20 |  | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  |  |  |  | 20 |  | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
| n105 | 15 |  | 5 | 10 | 15 | 20 | 253 | 303 | 353 |  |  |  |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 253 | 303 | 353 |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n106 | 15 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n109 | 15 |  | 5 | 10 | 15 | 20 | 25 | 30 |  | 403 |  | 503 |  |  |  |  |  |
|  | 30 |  |  | 10 | 15 | 20 | 25 | 30 |  | 403 |  | 503 |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 1: Void.NOTE 2: Void.NOTE 3: This UE channel bandwidth is applicable only to downlink.NOTE 4: This UE channel bandwidth is optional in this release of the specification.NOTE 5: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as an SCell part of DC or CA configuration.NOTE 6: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a downlink SCell part of CA configuration.NOTE 7: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 25 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 715.5-720.5 MHz or 730.5-735.5 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz.NOTE 8: This UE channel bandwidth is applicable only to uplink.NOTE 9: Void.NOTE 10: For this band, UE channel bandwidths which are applicable to sidelink operation are specified in Table 5.3E.1-1.NOTE 11: Not all frequency positions of 5 MHz carriers are possible due limitations of the SSB position relative to the 5 MHz channels. 5 MHz channels with Fc such that 2499+N\*1.2 ≤Fc<2499.3+N\*1.2MHz for 0≤N<157 are not compatible with SSB positions and cannot be used for 5 MHz n41.NOTE 12: This UE channel Bandwidth is optional for uplink in this release of the specification. |