**3GPP TSG-RAN WG4 Meeting # 114 R4-2500679**

Athens, Greece, 17th – 21st February, 2025

**Agenda item: 7.9.4**

**Source:** Ericsson

**Title:** Topic summary for [114][127] NR\_FR1\_7MHz\_BW

**Document for:** Information

# Introduction

The scope of this summary is the introduction of 7MHz Channel Bandwidth for n26 and n5 WI, summarizing contributions submitted under AI 7.9.

Based on the agenda, this summary is divided in 3 topics: the first one handles some general aspect (e.g. Work Plan), the second one handles the system parameters and UE RF aspects while the third one is related to BS RF impacts.

The proposal for this meeting, aligning with the work plan, would be to reach agreement at least on the following issues:

* Spectrum utilization (issue 2-1-1).
* Release independent aspect (issue 2.2-1).
* List of NS to be supported with 7 MHz channel BW and trigger A-MPR simulation(s). (issues 2-3-3 and 2-3-4).
* Refined scope (issues 3-1-1, 3-1-2, 3-1-3 and 3-1-4).

# Topic #1: General

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2500695**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2500695.zip) | China Telecom,T-Mobile USA | Workplan |
| [**R4-2502133**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2502133.zip) | Huawei, HiSilicon | **Proposal 1**: Recommend to update the WID with additional BS RF specifications, which are impacted by the introduction of 7 MHz channel bandwidth, e.g.   * AAS BS: TS 37.105, TS 37.145-1, TS 37.145-2 * MSR BS: TS 37.104, TS 37.141 * NR Repeater: TS 38.106, 38.115-1, 38.115-2 * NR BS EMC: TS 38.113 * MSR BS EMC: TS 37.113 |

## Open issues summary

*Before Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1

*Sub-topic description: Work plan*

**Issue 1-1: Workplan**

* Proposals
  + Option1: The work plan is agreeable.
  + Option 2: Any comment?
* Recommended WF
  + The work plan looks reasonable and could be agreed.

### Sub-topic 1-2

*Sub-topic description: WI update*

**Issue 1-2: WID revision**

* Proposals: Recommend updating the WID adding the following specifications:
  + - AAS BS: TS 37.105, TS 37.145-1, TS 37.145-2
    - MSR BS: TS 37.104, TS 37.141
    - NR Repeater: TS 38.106, 38.115-1, 38.115-2
    - NR BS EMC: TS 38.113
    - MSR BS EMC: TS 37.113
  + Agree
  + Disagree
* Recommended WF
  + This is more a RAN discussion. To save time, the recommendation is to not discuss this sub-topic online.

# Topic #2: System parameters and UE RF

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2500310**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2500310.zip) | Apple | **Proposal 1:** For 7MHz CBW set the NRB to 36 for 15kHz SCS.  **Proposal 2:** Introduce 7MHz channel to SEM requirements as proposed in Table 1.  **Observation:** Band n5 features NS\_100. This network signalling label provides A-MPR allowance for outer allocations and is bandwidth independent. Since 5MHz channel and 10MHz channel are covered by NS\_100 it is safe to assume that NS\_100 will be suited for 7MHz channel as well. Therefore, we do not expect any requirements work or n5 for NS\_100.  **Proposal 3:** Discuss which network signalling labels require the introduction of 7MHz channel to enable the work on A-MPR. |
| [**R4-2500408**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2500408.zip) | Huawei, HiSilicon | **Proposal 1:** For a 7 MHz CBW, to ensure a reasonable Tx out of band spectrum emission an NRB of 36 and a GB of 252.5 KHz need to be used.  **Proposal 2:** 7 MHz CBW should be optional and early implementable from release 15. Update TS38.101-1 Table 5.3.5-1 as shown below  **Proposal 3:** For a 7 MHz CBW, reuse the existing channel spacing formula and the existing channel raster design  **Proposal 4:** Reuse release 15 sync rasters of 38.101-1 Table 5.4.3.1-1.  **Proposal 5:** The summary of the impacted sections for RF requirements are given in Table 1. |
| [**R4-2500420**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2500420.zip) | Skyworks Solutions Inc. | **Proposal**: An NRB of 35RB is used for 15kHz SCS 7MHz channel bandwidth resulting in a 90% spectrum utilisation and 0.3425MHz lower guard band. With this type guard band, there is no need to recheck MPR.  **Proposal on additional emission requirements**:   * For band n5, A-MPR for NS\_100 should apply as is for 7MHz, if necessary, the current A-MPR values can be checked for 7MHz. * For n26, A-MPR studies for 7MHz are needed for NS\_12 and NS\_15. For NS\_13 and NS\_14 it should be first clarified if the requirement applies for a 7MHz CBW, as currently, 5MHz is the maximum CBW for NS\_13, and 10MHz is the minimum CBW for NS\_14.   + Given that the requirement applies at 1MHz offset for NS\_13, it is likely that a 7MHz CBW applies as well.   + Given that the requirement applies at 8MHz offset for NS\_13, it is possible that a 7MHz CBW does not apply.   **Proposal on 7MHz DL requirements**:   * Assuming a 35RB spectrum utilisation, the 7MHz REFSENS is -96.5dBm for n5, and -96dBm for n26, with 25RB REFSENS UL configuration. * The ACS requirement for a 7MHz CBW is copied from the requirement that applies to both 5MHz and 10MHz CBW case 1 and case 2. * The in-band blocking requirement for a 7MHz CBW is copied from the requirement that applies to both 5MHz and 10MHz CBW case 1 and 2. * The out of band blocking requirement for a 7MHz CBW is copied from the requirement that applies to both 5MHz and 10MHz CBW, range 1, 2 and 3. * The narrow band blocking requirement for a 7MHz CBW is copied from the requirement that applies to both 5MHz and 10MHz CBW. * The wideband intermodulation requirement for a 7MHz CBW is copied from the requirement that applies to both 5MHz and 10MHz CBW. * The spurious response requirement for a 7MHz CBW is copied from the requirement that applies to both 5MHz and 10MHz CBW. |
| [**R4-2500496**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2500496.zip) | Qualcomm Incorporated | **Observation 1**: Only one SCS is in WI scope for the addition of a new 7 MHz channel bandwidth.  **Proposal 1**: Introduction of new 7 MHz channel bandwidth in bands n26 and n5 for SCS = 15 kHz.  **Observation 2:** 37 RBs spectrum utilization for 7 MHz channel bandwidth would set stricter requirements both for Tx and Rx compared to existing channel bandwidths.  **Observation 3:** Significantly more power backoff is needed with 37 RBs spectrum allocation.  **Proposal 2:** Include 36 RBs for maximum transmission bandwidth configuration for 7 MHz channel bandwidth. |
| [**R4-2500557**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2500557.zip) | ZTE Corporation, Sanechips | **Proposal 1:** Maximum transmission bandwidth configuration for 7MHz CBW could be 36 RBs.  **Proposal 2:** Minimum guardband for 7MHz CBW could be 252.5kHz.  **Proposal 3:** The UE RF requirements for 7MHz CBW as listed in Table 3 should be discussed in RAN4. |
| [**R4-2501059**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2501059.zip) | CATT | **Observation:** A backward compatibility issue may occur when BS has 7MHz channel bandwidth and an initial BWP larger than 5MHz but less than 7MHz.  **Proposal:** RAN4 to consider the following two alternatives to handle the release independence of 7MHz channel bandwidth:   * Alt.#1: Restrict the maximum initial BWP size to 5MHz, then 7MHz channel bandwidth can be release independent from Rel-15.   Alt.#2: No restriction on initial BWP size, and 7MHz channel bandwidth can be release independent from Rel-19. |
| [**R4-2501060**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2501060.zip) | CATT | **Observation 1**: For band n5, a scaling factor of 1.5dB can be applied to REFSENS of 7MHz on top of that of 5MHz CBW.  **Observation 2:** For band n26, a scaling factor of 1.3dB can be applied to REFSENS of 7MHz on top of that of 5MHz CBW.  **Proposal 1:** RAN4 to specify the maximum transmission bandwidth configuration of 7MHz channel bandwidth as 35 PRBs.  **Proposal 2:** RAN4 to specify the minimum guard band of 7MHz channel bandwidth as 342.5kHz for SCS 15kHz.  **Proposal 3:** RAN4 to specify REFSENS as -96.5 dBm for 7MHz CBW with SCS 15kHz for band n5.  **Proposal 4:** RAN4 to specify REFSENS as -96.2 dBm for 7MHz CBW with SCS 15kHz for band n26. |
| [**R4-2501361**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2501361.zip) | Ericsson | **Observation1:** Based on the spectrum utilization and the minimum guard band analysis, the maximum transmission bandwidth configuration for 7 MHz should be 35 RBs, 36 RBs would slightly exceed the thresholds based on RAN4’s usage when introducing new a channel bandwidth. This should allow supporting NB-IoT operating in-band as well.  **Proposal1:** RAN4 to confirm that legacy UEs supporting 5 MHz channel bandwidth and not supporting the 10kHz enhanced channel raster shall be supported within the 7 MHz.  **Observation2:** Considering that legacy UEs (supporting 5 MHz channel BW and not supporting the 10kHz enhanced channel raster) shall be supported within 7 MHz, the maximum transmission bandwidth configuration for 7 MHz shall be an odd number of RBs.  **Proposal2:** Specify the maximum transmission bandwidth configuration with 35 RBs. |
| [**R4-2501479**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2501479.zip) | MediaTek (Wuhan) Inc. | **Proposal 1:** RAN4 to consider NRB =36 with SCS=15kHz for 7MHz channel bandwidth.  **Proposal 2:** Table 2 is used for UE RF requirements to support 7MHz NR FR1 CBW. |
| [**R4-2501824**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2501824.zip) | Nokia | [**Proposal 1:** It is proposed to assume 36 RBs for the maximum transmission bandwidth configuration for 7 MHz channel bandwidth.](#_Toc187400026)  [**Proposal 2:** The minimum guardband for 7 MHz is 252.5 kHz.](#_Toc187400027)  [**Proposal 3:** Channel spacing, channel raster and sync raster are not affected by the introduction of 7 MHz channel bandwidth.](#_Toc187400028)  [**Proposal 4:** The minimum output power for 7 MHz shall be -40 dBm.](#_Toc187400029)  [**Proposal 5:** Transmit OFF power for 7 MHz shall be -50 dBm.](#_Toc187400030)  [**Proposal 6:** Occupied bandwidth for 7 MHz channel bandwidth is the same as the channel bandwidth.](#_Toc187400031)  [**Proposal 7:** Spectrum emission mask for 7 MHz shall be based on the same formula as for 10 MHz.](#_Toc187400032)  [**Proposal 8:** The same NR and UTRA ACLR level for existing channel bandwidth shall be assumed.](#_Toc187400033)  [**Proposal 9:** Spurious emissions for 7 MHz channel bandwidth shall follow the formula for 5 MHz and wider channel bandwidths.](#_Toc187400034)  [**Proposal 10:** A-MPR for NS\_12, NS\_13, NS\_14 and NS\_15 for 7 MHz channel bandwidth shall be further evaluated for NR band n26.](#_Toc187400035)  [**Proposal 11:** Maximum input level for 7 MHz channel bandwidth is the same as 5 MHz and 10 MHz.](#_Toc187400036)  [**Proposal 12:** For 7 MHz channel bandwidth, the same ACS level for 5 MHz and 10 MHz shall be assumed.](#_Toc187400037)  [**Proposal 13:** It is proposed to assume the same in-band blocking level for 7 MHz as 5 MHz and 10 MHz.](#_Toc187400038)  [**Proposal 14:** It is proposed to assume the same out-of-band blocking level for 7 MHz as 5 MHz and 10 MHz.](#_Toc187400039)  [**Proposal 15:** It is proposed to scale the narrow band blocking level for 7 MHz from 5 MHz and 10 MHz. Pw=14.5 dB for 7 MHz should be assumed.](#_Toc187400040)  [**Proposal 16:** It is proposed to assume the same spurious response level for 7 MHz as 5 MHz and 10 MHz.](#_Toc187400041)  [**Proposal 17:** It is proposed to assume the same wide band intermodulation level for 7 MHz as 5 MHz and 10 MHz.](#_Toc187400042) |
| [**R4-2502199**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2502199.zip) | T-Mobile USA, China Telecom, Ericsson | **Observation 1:** NR channel bandwidths are release independent from Rel-15 unless otherwise stated in 38.307.  **Observation 2:** The WID says, “No impact to 38.307 is expected.”  **Observation 3**: The 35 and 45 MHz channel bandwidths were introduced in a Release 17 Work Item, but are release independent from Rel-15.  **Observation 4:** The 3 MHz channel bandwidth was introduced in Rel-18, and is only release independent from Rel-18, primarily because 3 MHz required RAN1 changes including support for a punctured SSB.  **Observation 5:** Since the 7 MHz channel bandwidth won’t require anything special like the punctured SSB, it should be release independent from Rel-15  **Observation 6:** The Release 15 ASN.1 has 16 bits in the channelBWs-DL-v1590 and channelBWs-UL-v1590 IEs, only 4 of which are currently allocated in 38.306. The remaining 12 are reserved for new channel bandwidths.  **Observation 7:** When 35 and 45 MHz were added in a Release 17 Work Item, bits were allocated in the Release 15 version of 38.307 without changing the ASN.1  **Observation 8:** It is up to RAN2 to decide if the signallng can support 7 MHz channel bandwidths from Release 15. RAN4 should not rule out release independence from Release 15 due to some perceived signalling issue.  **Observation 9:** Release independence from Release 15 does not mandate support to Release 15, it only makes it optional from Release 15.  **Proposal 1:** From a RAN4 perspective the 7 MHz channel bandwidth can be release independent from Rel-15.  **Proposal 2:** RAN4 should send an LS to RAN2 to see if RAN2 would have any concerns about 7 MHz being release independent from Rel-15. |
| [**R4-2502200**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2502200.zip) | T-Mobile USA | **Proposal:** RAN4 should choose between 35 and 36 RBs for 7 MHz channel bandwidth. |

## Open issues summary

### Sub-topic 2-1

*Sub-topic description:* System parameters for 7 MHz channel BW

**Issue 2-1-1: System utilization**

* Proposals: The maximum transmission bandwidth configuration (NRB) for 7 MHz channel BW should be:
  + Option 1: 36 (Apple, Huawei, Qualcomm, ZTE, Mediatek, Nokia, T-Mobile USA preference)
  + Option 2: 35 (Skyworks, CATT, Ericsson, T-Mobile USA)
* Recommended WF
  + At least 35 RBs could be supported.

For 36 RBs, need to check:

* + - If any MPR impact
    - If any issue when deploying 7 MHz with legacy UEs supporting 5 MHz but not the enhanced channel raster (see R4-2501361).

Note: no need to discuss the minimum guard band parameter, it will be derived from the NRB’s agreement.

CATT: for spectrum utilization, according to work plan, this should be decided in this meeting. Either we go with 35 or 36. For the 36RBs, we need justify MPR issue. We would like to check if there is throughput loss.

Skyworks: If using 36RBs, there is smaller guardband. We have to evaluate MPR for 36. This is complicated discussions.

OPPO: We can support 35RBs.

Nokia: we are proposing 36RBs. We would like to study the MPR until the next meeting.

Moderator: better to decide it now.

China Telecom: we have only four meetings. Suggest to decide it this meeting.

Qualcomm: We are OK to consider 35RBs.

Agreement:

* 35 RBs will be supported.

**Issue 2-1-2: Channel spacing, channel raster and sync raster**

* Proposals: Reuse the existing channel spacing formula, the existing channel raster design and reuse Rel-15 sync raster
  + Agree (Huawei, Ericsson, Nokia)
  + Disagree
* Recommended WF
  + No company raised any concern on those aspects. Introducing 7 MHz channel BW has no impact on channel spacing, channel raster nor sync raster.

### Sub-topic 2-2

*Sub-topic description:* Release independence

**Issue 2-2-1:**

* Proposals: Support of 7 MHz channel BW shall be:
  + Option 1: Optional and early implementable from release 15 (Huawei)
  + Option 2: Release independent from Rel-15 if the maximum initial BWP size is restricted to 5MHz (CATT – Alt 1)
  + Option 3: Release independent from Rel-19 if no restriction on initial BWP size (CATT – Alt 2).
  + Option 4: Release independent from Rel-15 (T-Mobile USA, China Telecom, Ericsson)
  + Other options are not precluded (e.g. Nokia commented during the summary review that f NRB=36 does not cause an MPR issue and is agreed, the earliest release can be Rel-16 because the enhanced channel raster should be supported).
  + Send LS to RAN2 if RAN2 would have any concerns about 7 MHz being release independent from Rel-15. (T-Mobile USA, China Telecom, Ericsson)
* Recommended WF
  + It seems everyone could agree that support of 7 MHz channel BW could be Release independent from Rel-15 but RAN4 should also discuss if the maximum initial BWP size shall then be restricted to 5 MHz.
  + A LS to RAN2 should be sent to check if RAN2 has any concern with supporting 7 MHz channel BW as release independent from Rel-15 feature.

CATT: for this recommended WF, we are fine with the first bullet. If BS assigns 7MHz, the initial BWP is beyond 5MHz then the legacy UE cannot access the network. We can further discuss it. For second, is it for this meeting only?

T-Mobile: This issue is similar to the case we have 25MHz. We do not think that we need restriction. For LS, we can do the same thing as for 25 and 35MHz.

CATT: this issue is slightly different from the case when we introduce 25 and 35MHz in terms of initial BWP size.

China Telecom: Support starting from Rel-15. The irregular CBW, the SIB1 can be with any number. Why do we need this restriction.

OPPO: For initial BWP, it can be left to network deployment.

Nokia: I do not understand CATT. Nothing new.

CATT: To China Telecom, SIB1 is for carrier bandwidth. The point is for initial BWP. That is different.

Intel: we share the comment from T-Mobile.

Agreement:

* Support of 7 MHz channel BW could be Release independent from Rel-15
  + FFS on if the maximum initial BWP size shall then be restricted to 5 MHz.
  + Support of 7MHz is optional in Rel-19 and in the previous releases

### Sub-topic 2-3

*Sub-topic description :* UE RF Tx requirements

**Issue 2-3-1: SEM**

* Proposals: SEM requirement for 7MHz channel BW is the same than the one for 10 MHz
  + Agree (Apple, ZTE, Ericsson, Nokia)
  + Option 2: TBA
* Recommended WF
  + Same SEM requirement for 7 MHz and 10 MHz channel BW.

**Issue 2-3-2: MPR**

* Proposals: The MPR requirement for 7 MHz channel BW is not impacted
  + Option 1: Agree (Huawei, MediaTek)
  + Option 2: Agree if NRB=35 and might be re-evaluated if NRB=36 (Skyworks, Ericsson).
* Recommended WF
  + Pending on issue 2-1-1

**Issue 2-3-3: NS\_100**

* Proposals: Current NS\_100 specification applies to 7 MHz channel BW, no impact
  + Option 1: Agree (Apple, Huawei, Skyworks, Ericsson, Nokia)
  + Option 2: TBA
* Recommended WF
  + There is no impact on A-MPR requirements for NS\_100.

Skyworks: no issue with this. The question is whether we need support it at all.

Agreement:

* There is no impact on A-MPR requirements for NS\_100.

**Issue 2-3-4: NS\_12, NS\_13, NS\_14, NS\_15**

* Proposals: Which NS are applicable to 7 MHz channel BW in band n26
  + NS\_12 (Huawei, Skyworks, ZTE, Ericsson, Nokia)
  + NS\_13 (Huawei?, Skyworks, ZTE, Ericsson, Nokia)
  + NS\_14 (Huawei, Skyworks?, ZTE, Ericsson, Nokia)
  + NS\_15 (Huawei, Skyworks, ZTE, Ericsson, Nokia)
* Recommended WF
  + NS\_12 and NS\_15 shall be supported for 7 MHz channel BW.
  + To be further discussed if NS\_13 and NS\_14 shall also be supported.

Skyworks: there are two NS values. Unless we have updated regulation, it is difficult to decide. Operator need clarify whether NS is needed or not.

AT&T: as we discussed yesterday, the proposal is related to n26.

Huawei: To Skyworks, it is better to have operator views on NS\_13/14

CATT: Generic comment is that when we introduce 7MHz the important issue is to avoid the NBC issue. For one band with minimal channel bandwidth is 10. The min CBW should not be changed when 7Mhz is introduced for a band.

Apple: We support NS values requested by operators. NS\_15 is interested.

Agreement:

* For n26
* NS\_12 and NS\_15 shall be supported for 7 MHz channel BW.
* To be further discussed if NS\_13 and NS\_14 shall also be supported.

**Issue 2-3-5: Minimum Output power, Transmit Off power, Occupied bandwidth, ACLR, general spurious**

* Proposals: Requirement for Minimum Output power, Transmit Off power, Occupied bandwidth, ACLR, general spurious and 7MHz channel BW is the same than the ones for 5 and 10 MHz channel BW. Other Tx requirements are not impacted.
  + Agree (Huawei, ZTE, Ericsson, Mediatek, Nokia)
  + Option 2: TBA
* Recommended WF
  + The requirement for 7 MHz is the same requirement than the requirement for 3-20 MHz. 7 MHz shall be added to:
    - Table 6.3.1-1 (minimum output power).
    - Table 6.3.2-1(Transmit Off power).
    - Table 6.5.1-1 (occupied bandwidth).
    - Table 6.5.2.4.1-1 (ACLR).
    - Table 6.5.3.1-1 (general spurious).
  + Other Tx requirements are not impacted by the introduction of 7 MHz channel BW.

### Sub-topic 2-4

*Sub-topic description:* UE RF Rx requirements

**Issue 2-4-1: REFSENS**

* Proposals:
  + Option 1: Assuming 35RBs SU, -96.5dBm for n5 and -96dBm for n26 with 25 RB configuration (Skyworks)
  + Option 2: -96.4 dBm for 7MHz (36 RB) @ n5 and n26 (Huawei)
  + -96.5 dBm for 7MHz CBW with SCS 15kHz for band n5 and -96.2 dBm for 7MHz CBW with SCS 15kHz for band n26 (CATT)
* Recommended WF
  + To be further discussed, pending also on issue 2-1-1.

**Issue 2-4-2: Maximum input level**

* Proposals: Requirement for 7MHz channel BW is the same than the one for 3-20 MHz
  + Agree (Huawei, ZTE, Ericsson, MediaTek, Nokia)
  + Disagree
* Recommended WF
  + The requirement for 7 MHz is the same requirement than the requirement for 3-20 MHz. 7 MHz shall be added to Table7.4-1.

**Issue 2-4-3: ACS, In-band blocking, Out of band blocking, Narrow Band blocking, Intermodulation, Spurious response**

* Proposals: Requirement ACS, In-band blocking, Out of band blocking, Narrow Band blocking, Intermodulation, Spurious response and 7MHz channel BW is the same than the one for 5 and 10 MHz channel BW. Other Rx requirements are not impacted.
  + Agree (Skyworks, Huawei, ZTE, Ericsson, MediaTek, Nokia)
  + Disagree
* Recommended WF
  + The requirement for 7 MHz is the same requirement than the requirement for 5 and 10 MHz. 7 MHz shall be added to:
    - Tables 7.5-1, 7.5-3 and 7.5-4 (ACS).
    - Table 7.6.2-1 (In-band blocking).
    - Table 7.6.3-1 (Out of band blocking).
    - Table 7.6.4-1 and evaluate Pw (Narrow band blocking).
    - Table 7.8.2-1(Intermodulation) and Table 7.7-1(Spurious response).
  + Other Rx requirements are not impacted.

# Topic #3: BS

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2500103**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2500103.zip) | Nokia | **Proposal 1**: only conducted BS requirements are covered within this WI  **Observation 1**: It should be clarified if NB-IoT operation in NR in-band is included within this WI |
| [**R4-2500558**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2500558.zip) | ZTE Corporation, Sanechips | **Proposal1:** To clarify whether only single carrier is considered for new added 7MHz WID.  **Proposal2:** To decide whether to define new FRCs or to reuse the legacy FRCs defined for 5 MHz/15 k SCS CBW for new added 7MHz/15 k SCS CBW.  **Proposal3:** To consider the proposals in Table 1 for BS RF requirement for 7 MHz channel bandwidths for n5 and n26. |
| [**R4-2500559**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2500559.zip) | ZTE Corporation, Sanechips | Draft CR to TS38.104 Introduction of 7 MHz NR FR1 channel bandwidth for NR bands n26 and n5 |
| [**R4-2500560**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2500560.zip) | ZTE Corporation, Sanechips | Draft CR to TS38.141-1 Introduction of 7 MHz NR FR1 channel bandwidth for NR bands n26 and n5 |
| [**R4-2500561**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2500561.zip) | ZTE Corporation, Sanechips | Draft CR to TS38.141-2 Introduction of 7 MHz NR FR1 channel bandwidth for NR bands n26 and n5 |
| [**R4-2501061**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2501061.zip) | CATT | **Proposal 1:** RAN4 to specify maximum transmission bandwidth configuration as 35 and the corresponding guard-band size as 342.5kHz for 7MHz channel bandwidth with SCS 15kHz.  **Proposal 2:** RAN4 to specify REFSENS as the same as that for channel bandwidths 5/10/15MHz.  **Proposal 3:** For conducted Rx dynamic range, RAN4 to specify the interfering signal mean power as -81dBm for WA, -76dBm for MR and -73dBm for LA.  **Proposal 4:** For radiated Rx dynamic range, RAN4 to specify the interfering signal mean power as -81- ΔOTAREFSENS for WA, -76- ΔOTAREFSENS for MR, and -73- ΔOTAREFSENS for LA. |
| [**R4-2501363**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2501363.zip) | Ericsson | **Proposal1:** Restrict the support of 7 MHz channel bandwidth to FDD bands below 1 GHz.  **Proposal2:** Do not specify 7 MHz channel bandwidth RF requirements for BS OTA requirements (7 MHz channel BW will then not be supported by BS type 1-H and BS type 1-O).  **Proposal3:** NB-IoT operating in NR in-band is also supported within 7 MHz channel bandwidth.  **Proposal4:** Clarify in the NCR and IAB specifications (TS 38.106 and TS 38.174) that 7 MHz channel bandwidth is not supported for those 2 types of nodes.  **Proposal5:** Agree with the system impacts listed in Table 1**.** |
| [**R4-2502134**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2502134.zip) | Huawei, HiSilicon | **Proposal 1**: Update the following requirements with 7MHz-dedicated modifications: Total power dynamic range, Rx dynamic range, RX IMD, ICS, OTA dynamic range, OTA RX IMD, OTA ICS.  **Proposal 2**: For the following requirements, refrain from adding 7MHz-decicated updates, and implement updates based on the range of channel bandwidths as defined in table 5.3.2-1: ACLR/CACLR, reference sensitivity, ACS, in-band blocking, OTA reference sensitivity level, OTA ACS, OTA in-band blocking. |

## Open issues summary

### Sub-topic 3-1

*Sub-topic description:* Refined scope for 7 MHz channel BW.

**Issue 3-1-1: BS type**

* Proposals: Only conducted BS are covered within this WI, not AAS BS.
  + Agree (Nokia, Ericsson)
  + Disagree (Implicitly suggested by ZTE, CATT and Huawei as they proposed updating the BS OTA requirements).
* Recommended WF
  + TBA (note that 3 MHz channel BW was only introduced for bands below 1 GHz and for BS type 1-C).

Huawei: looking at WID, what is the gain excluding AAS BS? Maybe we need another WI for AAS if we do not do it now.

T-Mobile: We looking band. No AAS is there. We just want to minimize the workload. We are fine to add AAS BS later.

Huawei: In a couple of meetings ago, we should not apply AAS for sub-1GHz.

Nokia: There was discussions for AAS below 1GHz. Support prioritizing conductive test.

CATT: We do not understand why 7 cannot support AAS. We are OK to specify conductive in this release.

Huawei: we need go to RAN for WID update. For some bands, the OTA requirements may be added later.

Nokia: workload for OTA is not minor.

**Issue 3-1-2: NB-IoT support**

* Proposals: NB-IoT operating in NR in-band should be supported in 7 MHz channel BW.
  + Agree (Ericsson)
  + Disagree
* Recommended WF
  + Currently, NB-IoT support is specified per NR band, not per channel BW. To be consistent with this approach, 7 MHz channel BW should support NB-IoT operating in NR in-band.

**T-Mobile: agree with Ericsson.**

**Intel: Are there any channel bandwidth for NB-IoT? It is some SA.**

**Moderator: there could be impact on BS spec.**

**Intel: It should be already supported.**

**Nokia: we need decide whether NB-IoT is supported in this WI.**

**Huawei: It is natively covered for 7MHz.**

**Agreement:**

* In-band NB-IoT can be supported in 7MHz channel BW

**Issue 3-1-3: Multi-carrier and CA**

* Proposals: Only single carrier (no CA) is considered for new added 7MHz WID.
  + Agree (ZTE)
  + Disagree (Implicitly suggested by Nokia, Ericsson and Huawei as they proposed updating the BS CACLR requirements).
* Recommended WF

Skyworks: We never discuss CA when we first introduce the CBW.

T-Mobile: The issue is that there is a lot bandwidth BCS4/5. I do not think there is impact on MSD. We do not need add any combination in this WID.

AT&T: Support T-Mobile comments. The new combo with BCS#0 needs addition of CBW in the table.

Skyworks: If 7MHz is highest or lowest, then there is no impact. Any channel bandwidth is optional for BCS4/5. That is not mandatory.

**Issue 3-1-4: IAB and NCR**

* Proposals: 7 MHz should not be supported by IAB and NCR
  + Agree (Ericsson)
  + Agree for IAB but disagree for NCR (Huawei, referring to issue 1-2)
  + Disagree
* Recommended WF

### Sub-topic 3-2

*Sub-topic description:* General approach when updating BS specifications.

**Issue 3-2: General approach when introducing requirement for 7 MHz channel BW**

* Proposals: For the following requirements, implement updates based on the range of channel bandwidths as defined in table 5.3.2-1: ACLR/CACLR, reference sensitivity, ACS, in-band blocking, OTA reference sensitivity level, OTA ACS, OTA in-band blocking
  + Agree (Huawei)
  + Disagree
* Recommended WF
  + This would avoid updating requirements when introducing new channel BW support.

### Sub-topic 3-3

*Sub-topic description :* ImpactedBS RF Tx requirements

**Issue 3-3-1: ACLR**

* Proposals: 7 MHz channel BW shall be added to the following ACLR requirements:
  + ACLR in non-contiguous spectrum or multiple bands, CACLR (Nokia. Ericsson)
  + ACLR only (ZTE)
  + Other
* Recommended WF
  + Pending on issue 3-1-3.

**Issue 3-3-2: Total power dynamic range**

* Proposals: The Total power dynamic range limit should be equal to:
  + 15.5 dB (ZTE, based on NRB=36).
  + Other
* Recommended WF
  + Pending on issue 2-1-1.

**Issue 3-3-2: EVM**

* Proposals: Add requirement for EVM widow length (Table B.5.2-1):
  + Agree (Nokia).
  + Other
* Recommended WF
  + Annex B.5.3 should be updated to include EVM window length for 7 MHz channel BW.

### Sub-topic 3-4

*Sub-topic description :* Impacted BS RF Rx requirements

**Issue 3-4-1: New FRCs**

* Proposals: Specify new FRCs for 7 MHz channel BW
  + Agree (ZTE)
  + Disagree (CATT proposed to reuse G-FR1-A1-1 FRC when specifying REFSENS for 7 MHz channel BW).
* Recommended WF

**Issue 3-4-2: REFSENS**

* Proposals: REFSENS limit for 7 MHz channel BW
  + Same value than for 5, 10 and 15 MHz (CATT, ZTE if no new FRC)
  + Other.
* Recommended WF
  + Pending on issue 3-4-1, if RAN4 decides to define specific FRC for 7 MHz channel BW.

**Issue 3-4-3: Dynamic range (conducted)**

* Proposals: Dynamic Range limit and Interfering signal level for 7 MHz channel BW
  + Same value than for 5, 10 and 15 MHz with an interferer power level of as -81dBm for WA, -76dBm for MR and -73dBm for LA (CATT)
  + Same value than for 5, 10 and 15 MHz with an interferer power level of as -80.9dBm for WA, -75.9dBm for MR and -72.9dBm for LA (ZTE if no new FRC)
  + Other
* Recommended WF
  + Pending on issue 3-4-1.

**Issue 3-4-3: Dynamic range (radiated)**

* Proposals: Dynamic Range limit and Interfering signal level for 7 MHz channel BW
  + Same value than for 5, 10 and 15 MHz with an interferer power level of as -81- ΔOTAREFSENS dBm for WA, -76- ΔOTAREFSENS dBm for MR and -73- ΔOTAREFSENS dBm for LA (CATT)
  + Same value than for 5, 10 and 15 MHz with an interferer power level of as -80.9- ΔOTAREFSENS dBm for WA, -75.9- ΔOTAREFSENS dBm for MR and -72.9- ΔOTAREFSENS dBm for LA (ZTE if no new FRC)
  + Other
* Recommended WF
  + Pending on issues 3-1-1 and 3-4-1.

**Issue 3-4-4: Other impacted Rx requirements**

* Proposals: The following Rx requirements should be updated adding 7 MHz channel BW: ACS, general blocking, narrowband blocking, receiver intermodulation, ICS
  + Agree (Nokia, ZTE, Ericsson)
  + Disagree
* Recommended WF
  + The following Rx requirements should also be updated to include 7 MHz channel BW:
    - ACS.
    - General blocking.
    - Narrowband blocking.
    - Receiver intermodulation
    - ICS.