**3GPP TSG-RAN WG4 Meeting # 104-e R4-22XXXXX**

**Electronic Meeting, 15– 26 August 2022**

**Agenda item:** 12.4.4.

**Source:** Moderator (SWR/EBU)

**Title:** Email discussion summary for [104-e][316] LTE\_terr\_bcast\_bands\_BSRF

**Document for:** Information

# Introduction

This document summarizes the email discussion for the following agenda item

12..4.4 BS RF requirement maintenance [LTE\_terr\_bcast\_bands\_part2-Core]

for the Rel-18 work item on 5G Broadcast (RP-220518). Discussion of other agenda items related to 12.4 including Proposals 1 and 2 in documents R4-2211555, R4-2211981, R4-2211982, R4-2212099 and Proposals 1 and 2 in R4-2211585 are treated in thread 128.

It is appreciated that the delegates for this topic put their contact information in the table below.

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
| ZTE | Fei Xue | Xue.fei25@zte.com.cn |
| Rohde & Schwarz | Niels Petrovic | Niels.petrovic@rohde-schwarz.com |
| Ericsson | Dominique Everaere | dominique.everaere@ericsson.com |
| Huawei | Peng (Henry) ZhangMichal Szydelko | zhangpeng169@huawei.commichal.szydelko@huawei.com |
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| Qualcomm | Bin Han | binhan@qti.qualcomm.com |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)

# Topic #1: Coexisting Studies between IMT service around DTT spectrum

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2213699](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213699.zip) | ZTE Corporation | Proposal 1: there is no need of further coexistence study between IMT service and DTT service {LTE based broadcast in Rel-17} in RAN4.Proposal 2: for IMT service, it could follow the existing 3GPP RAN4 requirements and for DTT service {LTE based broadcast BS in Rel-17}, it should follow the regulatory requirements.Observation 1: the coexistence study between IMT service around DTT spectrum and DTT service has been well studied in the past when IMT bands around DTT spectrum was introduced.  |

## Open issues summary

*ZTE proposes not to conduct no further coexisting study between IMT service and DTT service. Instead existing 3GPP RAN4 requirements for IMT should be followed as for DTT.*

* + Any concerns with the above? Any other aspect that needs consideration?

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
| ZTE | To further clarify our proposals, for existing IMT-BS coexisting with DTT BS, it’s proposed to follow the requirement in TS 36.104 for the protection of DTT. For DTT coexisting with legacy E-UTRA BS, we propose to follow the regulatory requirement to show its compliance. |
| Rohde & Schwarz | We agree with the ZTE assessment and also think that there is no further coexistence study required in this case. |
| Ericsson | As commented in the other thread#128, we still need to study HPHT deployment which has not been considered so far. |
| Huawei | Tend to agree with ZTE, but more studies about current regulatory requirements are welcome in case working group miss something. |
| Nokia | As far as 5G broadcast BS fulfills the DTT emission requirements, there is no need for further co-existence study between 5G broadcast and IMT. However, BS-UE co-existence studies might be needed to prove BS ACLR/UE ACS defined for 5/10MHz LTE can be reused for 6/7/8MHz in broadcast band. |
| Qualcomm | We support ZTE’s proposal. We can follow the legacy requirements and regulatory requirements in regions. If we go with co-ex study, we should limit the scope and co-ex verification should be enough. |

## Summary for 1st round

### Open issues

There is a high agreement to limit the scope of further studies and re-use the results of existing studies. Nevertheless there are some reservations that new studies might be needed, especially in case of HTHP deployment, UE co-existence for 6/7/8 MHz channel bandwidths or if the group finds out that something is missing.

The moderator proposes possible ideas, but others are welcome:

1. Collate the studies to verify. Report on possible solutions for identified, unresolved technical issues.
2. Limit the topics of studies on HTHP deployment, regulatory requirements, required BS ACLR/ UE ACS values and UE performance in presence of 6/7/8 MHz broadcast bands. Collate the studies to verify. Report on possible solutions for identified, unresolved technical issues.
3. Report on possible solutions for identified, unresolved technical issues, taking into account among others:
[1] TS 36.104
[2] In ITU Region 1 operation of transmitters of the broadcasting service are governed by the Technical Annexes of the GE06 Agreement and ETSI specification ETSI EN 302 296.
[3] In ITU Region 2, the relevant documents are offered by corresponding national regulators such as FCC in the US and Anatel in Brazil
Title 47 CFR 73.622, Digital television table of allotments, FCC, United States
ABNT 15601, NORMA BRASILEÑA, Televisión digital terrestre — Sistema de transmisión ISDB-Tb, Anatel, Brazil
[4] In ITU Region 3, national regulation is applied in coordination and negotiation between affected administrations, such as China.
GB20600-2006 [8], Framing structure, channel coding and modulation for digital television terrestrial broadcasting system, National Radio and Television Standardization Technical Committee, People’s Republic of China
[5] ITU-R BT.2033 Planning criteria, including protection ratios, for second generation of digital terrestrial television broadcasting systems in the VHF/UHF bands
[6] ITU-R BT.2215-7 Measurements of protection ratios and overload thresholds for broadcast TV receivers

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|  | **Status summary**  |
|  | *Tentative agreements: None**Candidate options:* Option 1: Collate the studies to verify. Report on possible solutions for identified, unresolved technical issues.Option 2: Limit the topics of studies on HTHP deployment, regulatory requirements, required BS ACLR/ UE ACS values and UE performance in presence of 6/7/8 MHz broadcast bands. Collate the studies to verify. Report on possible solutions for identified, unresolved technical issues.Option 3: Report on possible solutions for identified, unresolved technical issues, taking into account among others:[1] TS 36.104[2] In ITU Region 1 operation of transmitters of the broadcasting service are governed by the Technical Annexes of the GE06 Agreement and ETSI specification ETSI EN 302 296.[3] In ITU Region 2, the relevant documents are offered by corresponding national regulators such as FCC in the US and Anatel in BrazilTitle 47 CFR 73.622, Digital television table of allotments, FCC, United StatesABNT 15601, NORMA BRASILEÑA, Televisión digital terrestre — Sistema de transmisión ISDB-Tb, Anatel, Brazil[4] In ITU Region 3, national regulation is applied in coordination and negotiation between affected administrations, such as China.GB20600-2006 [8], Framing structure, channel coding and modulation for digital television terrestrial broadcasting system, National Radio and Television Standardization Technical Committee, People’s Republic of China[5] ITU-R BT.2033 Planning criteria, including protection ratios, for second generation of digital terrestrial television broadcasting systems in the VHF/UHF bands[6] ITU-R BT.2215-7 Measurements of protection ratios and overload thresholds for broadcast TV receiversOption 4: different option*Recommendations for 2nd round:* Further discussion in the second round based on the above listed options or others as companies propose. WF assigned. |

## Discussion on 2nd round (if applicable)

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| **Company** | **Comments** |
| Ericsson | It was not clear to us what is the intention really with this topic#1 and the proposed options above, if it overlaps or not the other WF on coex study in thread#128. We tried to clarify our understanding in a revised WF. |
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## Summary for 2nd round

After setting up the WF the intention had to be clarified. The focus of the revised WF is how to implement the coexistence requirement by referring to regulatory requirement or defining new explicit requirement in 3GPP similar as band 20.
There is still a discussion if this WF doc overlaps with Topic 3 of this thread. It was proposed to merge, but not agreed yet.

Discussions are going on.

# Topic #2: List of expected Changes to 36.104 due to introduction of LTE based 5G terrestrial broadcast band(s)

## During RAN#92-e, the WID on new bands and bandwidth allocation for LTE based 5G terrestrial broadcast has been approved. This document focuses on the impact to BS RF requirements in 36.104.

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2213580](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213580.zip) | Nokia, Nokia Shanghai, Bell | **Proposal:** On top of any other requirements, as for introduction of any LTE band, additional 36.104 changes are expected due to introduction of LTE based 5G terrestrial broadcast band(s) at least in the following Clauses unless co-existence/co-location requirements should not be covered by this Work Item:Clause 6.6.4.3 Additional spurious emissions requirementsClause 6.6.4.4 Co-location with other base stationIt is proposed to take into account BS requirements details above for LTE based 5G terrestrial broadcast band(s) introduction to 36.104. It should be noted this document focuses on Core BS requirements only, additional impact may be expected to BS conformance testing, e.g. by introducing new test models |

## Open issues summary

*When introducing any LTE based terrestrial broadcast band(s) 36.104 should be updated at least in the Clauses 6.6.4.3 and 6.6.4.4*

* + Any concerns with the above? Any other aspect that needs consideration?

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
| ZTE | For the co-location with other BS stations, since this requirement is targeted to protect its receiver, we think it might be not needed. For additional spurious emission requirement for LTE based broadcast BS, at leas receiver impact is not need and for the requirements for transmitter, this need more discussion in RAN4. |
| Rohde & Schwarz | Not sure if 6.6.4.3 and 6.6.4.4 since they are designed to protect other BS deployments in the cellular network. We can further discuss. |
| Huawei | The proposal is too general. Not sure what is the intention of proponent. More specific proposals are welcome. |
| Nokia | As mentioned in R4-2213580, detailed analysis needs to be performed for each BS requirement if existing requirements are applicable/can be reused for LTE based 5G terrestrial broadcast operation. With respect to co-existence and co-location requirements, while there is no impact to protect own receiver, confirmation is needed requirements for defined bands can be met for operation LTE based 5G terrestrial broadcast band. |

## Summary for 1st round

### Open issues

A more specific list of corresponding changes to TS 36.104 is needed.

In particular, a confirmation is needed that the modified BS requirements for an operation of LTE based 5G terrestrial broadacst band still meet the requirements for existing bands.

The moderator proposes some ideas, but others are welcome:

* + - 1. Identify a list of changes
			2. Identify a list of changes to TS 36.104
			3. Identify a list of changes to TS 36.104, no need to study receiver impact

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|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements: none**Candidate options:*Option 1: Identify a list of changesOption 2: Identify a list of changes to TS 36.104Option 3: Identify a list of changes to TS 36.104, no need to study receiver impactOption 4: other solution*Recommendations for 2nd round:* Discussion of the given options. A WF is assigned. |
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## Discussion on 2nd round (if applicable)

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| **Company** | **Comments** |
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*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

## Summary for 2nd round

The WF proposes companies to provide analysis in RAN4#104-bis-e if either existing TS 36.104 requirements or new requirements are needed for LTE based 5G terrestrial broadcast band(s), while not only focussing on Tx requierements but also on Rx requirements. The analysis should include potential impact to co-existence and co-location requirements.

The WF doc is recommended for agreement.

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# Topic #3: Reuse of existing regulatory agreements

## These papers provided by several network operators adress band definition and BS requirements for LTE based 5G Broadcast. Proposals 1 and 2 are treated in thread 128.Propsals 3 request to reuse existing regulatory agreements when operating LTE based 5G Broadcast.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2212099](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212099.zip) | TDF | **Proposal 3:** RAN4 to re-use BS requirements as provided in existing regulatory agreements and documentation provided by the ITU and national regulators for the broadcasting service. |
| [R4-2211981](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211981.zip) | Cellnex | **Proposal 3:** RAN4 to re-use BS requirements as provided in existing regulatory agreements and documentation provided by the ITU and national regulators for the broadcasting service. |
| [R4-2211982](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211982.zip) | BNE | **Proposal 3:** RAN4 to re-use BS requirements as provided in existing regulatory agreements and documentation provided by the ITU and national regulators for the broadcasting service. |
| [R4-2211555](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211555.zip) | SWR, EBU | **Proposal 3:** RAN4 to re-use BS requirements as provided in existing regulatory agreements and documentation provided by the ITU and national regulators for the broadcasting service. |
| R4-2211585 | Rohde & Schwarz | **Proposal 3:** Re-use the existing transmitter requirements as of Digital Terrestrial TV Transmitters. |

## Open issues summary

*5G Broadcast has the potential to become a global solution enabling the delivery of linear media services to mobile devices and connected vehicles. The UHF band spectrum can be used to operate 5G Broadcast, and the networks deployment can leverage existing HPHT broadcast terrestrial network infrastructure.*

*The BS requirements as provided in existing regulatory agreements and documentations provided by ITU and national regulators for the broadcasting service should be reused.*

* + Any concerns with the above? Any other aspect that needs consideration?

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
| ZTE | Agree with the proposal to follow the regulatory requirements instead of specifying new requirements for it unless there are other specific requests or deployment scenario to be considered. |
| Ericsson | Further analysis would be needed here. Anyway, Regulation is always an input to 3GPP when specifying requirements, this should be the case here as well. This doesn’t preclude 3GPP to specify other/additional requirements to guarantee network performance. |
| Nokia | It is not clear what is meant by re-use existing BS requirements. As mentioned in R4-2213580, detailed analysis needs to be performed for each BS requirement if existing requirements are applicable/can be reused for LTE based 5G terrestrial broadcast operation. Additional regulatory requirements can be references in relevant specifications. |
| Qualcomm | We agree with the proposal to reuse existing regulatory requirements and ITU documentations the broadcasting service. |
| Huawei | Similar as comments above. Regulatory requirements are always the baseline for RAN4 to follow, despite other potential vendor/operator driven requirements in RAN4.With this, further discussion on additional clarification is advised during the second round, possibly aiming to setup the work-plan/work-split, or some kind to WF to better structure the work expected for the next meeting. |

## Summary for 1st round

### Open issues

There is a high agreement that 3GPP follows existing regulatory requirements and should continue to do so. By doing so there must be verified that there is an existing regulatory requirement.
There are also some remarks that additional requirements might be necessary when missing. A WF will be assigned.

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|  | **Status summary**  |
|  | *Tentative agreements: none**Candidate options:**Option 1: Existing regulatory requirements are to be used as a baseline for RAN4 to follow. When indicated, additional requirements are needed to cover open technical issues**Option 2: other solution**Recommendations for 2nd round: Discussion on the given options. WF will be assigned.* |

## Discussion on 2nd round (if applicable)

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| **Company** | **Comments** |
| Ericsson | It’s common practice in RAN4 to consider existing regulations when specifying any new band, option 1 would make sense. |
| Huawei | WF was drafted based on Option 1.  |
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*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs*

## Summary for 2nd round

The WF was drafted based on Option 1. There is agreement that relevant existing regulatory requirements are to be used as a baseline for RAN4 specifications.
Still there is a discussion if the WF of Topic 1 of this thread can be merged with this one.

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
|  | WF on … | YYY |  |
|  | LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
| R4-2214383 | WF on Coexisting studies between IMT service around DTT spectrum | ZTE |  |
| R4-2214384 | WF on List of expected changes to TS 36.104 due to introduction of LTE based 5G terrestrial broadcast band(s) | Nokia |  |
| R4-2214385 | WF on Reuse of existing regulatory agreements | Huawei |  |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-22xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| [R4-2213699](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213699.zip) |  | Discussion on BS RF requirements for LTE based broadcast | ZTE Corporation | Noted |  |
| [R4-2213580](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213580.zip) |  | BS requirements for LTE based 5G terrestrial broadcast band(s) | Nokia, Nokia Shanghai, Bell | Noted |  |
| R4-2211555 |  | BS requirements for 5G terrestrial broadcast | SWR | Noted |  |
| R4-2211585 |  | Discussion on Introduction of new bands and bandwidth allocation for LTE based 5G terrestrial broadcast | ROHDE & SCHWARZ | Noted |  |
| R4-2211981 |  | BS requirements for 5G terrestrial broadcast | Cellnex | Noted |  |
| R4-2211982 |  | BS requirements for 5G terrestrial broadcast | BNE | Noted |  |
| R4-2212099 |  | BS requirements for 5G terrestrial broadcast  | TDF | Noted |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-22xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-22xxxxx |  | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-22xxxxx |  | LS on … | ZZZ | Agreeable, Revised, Noted |  |
| R4-2214383 |  | WF on Coexisting studies between IMT service around DTT spectrum | ZTE |  | *Still under discussion*  |
| R4-2214384 |  | WF on List of expected changes to TS 36.104 due to introduction of LTE based 5G terrestrial broadcast band(s) | Nokia | Agreeable |  |
| R4-2214385 |  | WF on Reuse of existing regulatory agreements | Huawei |  | *Still under discussion* |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents