**3GPP TSG RAN Meeting #90e RP-202921**

**Electronic Meeting, December 7-11, 2020** (revision of RP-202898)

**Source: Qualcomm**

**Title: New WID on NR Repeaters**

**Document for: Approval**

**Agenda Item: 9.1.5**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

# Title: NR Repeaters

## Acronym: NR\_Repeaters

## Unique identifier:

NOTE: For new WIs/SIs leave the Unique identifier empty and make a proposal for an Acronym.

 For a revised WI/SI: Take Unique identifier and acronym as shown in 3GPP workplan.

 If this is a RAN WID including Core and Perf. part, then Title, Acronym and Unique identifier refer to the feature WI.

 Please tick (X) the applicable box(es) in the table below:

 Either:

|  |  |
| --- | --- |
| **This WID includes a Core part** | **X** |
| **This WID includes a Performance part** |  |

 or:

|  |  |
| --- | --- |
| **This WID includes a Testing part** |  |
| **and it addresses the following 3GPP work area:** | **Radio Access** |  |
| **Core Network** |  |
| **Services** |  |

Potential target Release: Rel-17

Note that this field above indicates the proposed Release at the time of submission of the WID to TSG approval. It can later be changed without a need to revise the WID. The updated target Release is indicated in the Work Plan. NOTE: In case of contradiction with the target dates of clause 5, clause 5 determines the target release.

## 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Affects:** | UICC apps | ME | AN | CN | Others (specify) |
| **Yes** |  |  | X |  |  |
| **No** | X | X |  | X |  |
| **Don't know** |  |  |  |  |  |

## 2 Classification of the Work Item and linked work items

### 2.1 Primary classification

This work item is a …

|  |  |
| --- | --- |
| X | Feature |
|  | Building Block |
|  | *Work Task* |
|  | Study Item |

NOTE: Normally, Core/Perf./Testing parts in RAN WIDs are Building Blocks. Only if they are under an SA or CT umbrella, they are defined as work tasks. If you are in doubt, please contact MCC.

### 2.2 Parent Work Item

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
|  |  |  |  |

NOTE: RAN agreed some time ago, that it describes the feature WI + Core/Perf. part WI or Testing part WI in one WID. Therefore the table above should just include the feature WI data (In case the feature covers Core and Perf. part, please list under Working Group the leading WG of the Core part).

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work Items (if any) |
| Unique ID | Title | Nature of relationship |
|  |  | *{optional free text}*  |

NOTE: Also related or dependent WIs/SIs in other TSGs should be indicated.

**Dependency on non-3GPP (draft) specification**:

## 3 Justification

Coverage is a fundamental aspect of cellular network deployments. Mobile operators resort to different types of network nodes to offer blanket coverage in their deployments. While the deployment of regular full-stack cells is preferred, it may not be always a possible (e.g., not availability of backhaul) or economically viable option.

As a result, new types of network nodes have been considered to increase mobile operators’ flexibility for their network deployments. E.g. NR Rel-16 has introduced a new type of network node not requiring a wired backhaul through the specification of Integrated Access and Backhaul (IAB). Another type of network node is the RF repeater. RF repeaters have been used in 2G, 3G and 4G deployments to supplement the coverage provided by regular full-stack cells with various transmission power characteristics. They constitute the simplest and most cost-effective way to improve network coverage. To date, there is no definition of RF repeaters for NR and this project addresses this deficiency (FR1 FDD).

As NR moves to higher frequencies (around 4GHz for FR1 deployments and above 24GHz for FR2) propagation conditions degrade compared to lower frequencies exacerbating the coverage challenges. As a result, further densification of cells may be necessary. Multi-antenna techniques consisting of massive MIMO for FR1 and analog beamforming for FR2 assist in coping with the more challenging propagation conditions of these higher frequencies.

Note that all the frequency bands defined at this higher frequency regime are TDD. Another common property of these NR systems is the use of multi-beam operation with associated beam management in FR2.

This work item will specify requirements for RF repeaters for NR.

## 4 Objective

### 4.1 Objective of SI or Core part WI or Testing part WI

Normative work phase objective [RAN4]

* Specify RF and EMC requirements for NR repeaters
* Consider FR1 (FDD and TDD) and FR2 (TDD) bands

For the above objective, the leveraging of RF specifications for LTE repeater and IAB should be sought.

It is assumed that the repeater does not perform adaptive beamforming towards the UE

The following constraint may be considered, as needed, to contain the workload associated with this project:

* Repeater meets both BS and UE emissions requirements (or the more stringent absolute level in dBm) in all slots

### 4.2 Objective of Performance part WI

NOTE: Leave empty if the WI proposal does not contain a RAN performance part.

Corresponding conformance testing for NR repeaters.

### 4.3 RAN time budget request (not applicable to RAN5 WIs/SIs)

NOTE: For all new RAN related WIs/SIs which are not led by RAN WG5 the WI/SI rapporteur has to fill out the attached Excel table to request time budgets for corresponding RAN WG meetings.
The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI.
One time unit (TU) corresponds to ~ 2 hours in the meeting.
If no TU is needed, then leave the field empty otherwise enter a number >0 in the field.

 For revisions of already approved WI/SI descriptions: Please remove the Excel table from the WID/SID's zip file. The time budgets are already recorded. If you want to modify them, then this has to be done via the status report and not via a revised WID/SID.

 If this WID is covering Core and Performance part, then please fill out one line for each part in the attached Excel table.

**additional comments to the time budget request in the attached Excel table:**

## 5 Expected Output and Time scale

|  |
| --- |
| **New specifications** *{One line per specification. Create/delete lines as needed}* |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Remarks |
| TS | 38.xxx | NR repeater radio transmission and reception | *RAN#93* | *RAN#94* | TBD |
| TS | 38.xxx | NR; Repeaters ElectroMagnetic Compatibility (EMC) | *RAN#93* | *RAN#94* | TBD |

NOTE: If this is a RAN WI including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Remarks for each spec.
By default a new specs can only be new for one of both parts.

|  |
| --- |
| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
|  |  |  |  |

NOTE: If this is a RAN WI including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Remarks for each spec.
If an existing spec is affected by both (Core part and Perf. part), then it has to be listed twice with appropriate approval dates.

## 6 Work item Rapporteur(s)

## 7 Work item leadership

RAN4

## 8 Aspects that involve other WGs

NOTE: For RAN WIs: Section 8 applies only to WGs outside of TSG RAN because RAN WG aspects have to be covered in section 4.

## 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| Qualcomm |
| Commscope |
| MediaTek Inc. |
| Verizon Wireless |
| CMCC |
| Telstra |
| Telecom Italia |
| Deutsche Telekom |
| Orange |
| Charter Communications, Inc |
| T-Mobile USA |
| KT Corp. |
| AT&T |
| British Telecom |
| China Telecom |
| KDDI |
| CableLabs |
| CHTTL |
| FirstNet |
| ZTE |