3GPP TSG-RAN WG4 Meeting #100-e R4-21xxxxx

Electronic Meeting, Aug. 16 – Aug. 27, 2021

Agenda Item: 10.6.1, 10.6.2, 10.6.3, 10.6.4, 10.6.5

Source: Nokia

Title: WF on ‘Optimizations of pi/2 BPSK uplink power in NR’ in Rel-17

Document for: Approval

# 1 TX Signal placement in channel bandwidth

The latest email discussion summary [1] captures the issue in the following way:

|  |
| --- |
| **Issue 1-1-1:  *TX Signal placement in channel bandwidth***  Companies agreed to study this issue further to determine whether a signal placement restriction within a given BW is required  Recommendation  Capture as agreement in WF |

**Proposed agreement #1:**

**Study the Tx signal placement in channel bandwidth further to determine whether a signal placement restriction within a given BW is required.**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Qualcomm | Agree with proposed agreement |
|  |  |
|  |  |

# 2 Adjustment of ACLR requirements

The latest email discussion summary [1] captures the issue in the following way:

|  |
| --- |
| **Issue 1-1-2:  *Do ACLR requirements need to be adjusted* if power is boosted by more than 3dB. *(moderator’s edit: relative to 29 dBm)***  Companies agreed that if the output power is increased beyond PC1 levels, the ACLR would have to be re-evaluated.  Recommendation  Capture as agreement in WF |

**Proposed agreement #2:**

**If the UE output power reaches the next power class, the ACLR requirement is re-evaluated**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Qualcomm | Agree with proposed agreement |
| OPPO | Ok with proposed agreement |
|  |  |

# 3. UE type considered for power enhancement

The latest email discussion summary [1] captures the issue in the following way:

|  |
| --- |
| **Issue 1-1-3:  *UE type considered for power enhancement in SI***  Companies agreed to initially address UE handhelds with PC2 as a baseline  Recommendation  Capture as agreement in WF |

**Proposed agreement #3:**

**UE handheld with PC2 is addressed as a baseline for the power enhancement**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Qualcomm | Agree with proposed agreement |
| OPPO | Ok with proposed agreement |
|  |  |

# 4. TR skeleton on optimization of pi/2 BPSK uplink power in NR

The latest email discussion summary [1] captures the issue in the following way:

|  |
| --- |
| **Issue 1-3-1: *TR skeleton on optimization of pi/2 BPSK uplink power in NR***   * Proposals   + Option 1: Updated TR skeleton is agreeable.   + Option 2: Needs further updating   One company wanted to add one paragraph for “Net gain analysis of combined Tx and Rx impacts” |

**Proposed agreement #4:**

**Updated TR skeleton including one additional paragraph (“Net gain analysis of combined Tx and Rx impacts”) is agreed**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Qualcomm | We are agreeable to update TR |
|  |  |
|  |  |

# 5. Study of power enhancement for PC2 UE

The latest email discussion summary [1] captures the issue in the following way:

|  |
| --- |
| **Issue 1-1-4:**  ***Study of power enhancement for PC2 UE***  Some companies wanted to set a power enhancement target for the SI prior to doing PA measurements. While another company thought it better to set a power enhancement value based on PA measurements.  Recommendation:   * Further discuss in 2nd round * Discussion could focus on   + Motivation for establishing a power target apriori   Should a power enhancement value be based on PA measurements from participating companies |

The way forward is to continue discussion in the 2nd round.

**Proposed agreement #5:**

**Limit the maximum output power to 29dBm at antenna port for PC2 amplifiers single PA architecture and use this as 0dB MPR reference**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Qualcomm | The power enhancement value should be based on PA measurements. Could proponents explain the motivation for establishing a power target apriori? What happens if the established target cannot be achieved? |
| OPPO | Agree with QC comment. |
| IITH, IITM, CEWIT, Reliance Jio, Tejas Networks | We need to study and determine achievable power levels. We cannot set targets at this stage. |

# 6. UE signaling and network configuration

The latest email discussion summary [1] captures the issue in the following way:

|  |
| --- |
| **Issue 1-1-5:  *UE signaling and network configuration***  Most companies thought that it may be too early to discuss signaling. Some companies thought that reusing existing UE signaling was a good starting point. Other companies thought that signaling is conditional on what is agreed.  Recommendation:  Signaling can be discussed further in future meetings |

The way forward is to defer the discussion related to UE signalling and network configuration until the scope of Rel-17 (candidate) solutions is more mature.

**Proposed agreement #6:**

**Post pone to WI phase.**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Qualcomm | Agree with proposed agreement |
| OPPO | Ok with proposed agreement |
|  |  |

# 7. Transparent spectral shaping

The latest email discussion summary [1] captures the issue in the following way:

|  |
| --- |
| **Issue 1-2-1: *Transparent spectral shaping***  Most companies supported keeping the Rel-15 approach (i.e. transparent spectral shaping to gNB receiver) in Rel-17 where both DMRS and data are shaped and the actual pulse shaping filter is left for UE implementation.  One company thought that to improve performance specifying the shaping filter was necessary  Recommendation:  Further discussion in 2nd round |

The way forward is to continue discussion in the 2nd round.

**Proposed agreement #7:**

**Keep the Rel-15 approach (i.e. transparent spectral shaping to gNB receiver) in Rel-17 where both DMRS and data are shaped and the actual pulse shaping filter is left for UE implementation.**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Qualcomm | Keep rel-15 approach in Rel-17 unless a different scheme can be justified |
| OPPO | Ok with proposed agreement |
| IITH, IITM, CEWIT, Reliance Jio, Tejas Networks | The study requires a specific shaping filter to be narrowed down and we are not yet ready to make this decision. |

# 8. Pulse shaping filter characteristics

The latest email discussion summary [1] captures the issue in the following way:

|  |
| --- |
| **Issue 1-2-2:  *Pulse shaping filter characteristics***  Most companies supported following the general RAN4 principle that the requirements are implementation agonistic, and which shaping filter type is selected is up to UE implementation and should not be limited to certain type during the study  One company thought that to improve performance specifying the shaping filter was necessary  Recommendation:   * Company responses were consistent between issues 1-2-1 and 1-2-2 so in the future these two topics can be discussed together   Further discussion in 2nd round |

The way forward is to continue discussion in the 2nd round.

**Proposed agreement #8:**

**RAN4 principle that the requirements are implementation agonistic, and which shaping filter type is selected is up to UE implementation and should not be limited to certain type during the study**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Qualcomm | See answer to section 7 |
| OPPO | Ok with proposed agreement |
| IITH, IITM, CEWIT, Reliance Jio, Tejas Networks | Same answer as section 7 |

# 9. Spectral flatness requirements (PRB ≥16)

The latest email discussion summary [1] captures the issue in the following way:

|  |
| --- |
| **Issue 1-2-3:  *Spectral flatness requirements (PRB ≥16)***  Most companies elected to keep the current spectral flatness requirements for large PRB allocations (e.g. ≥ 16 PRBs) (*moderator’s comment: current spectral flatness refers to spec in section 6.4.2.4.1, TS 38.101-1)*  One company decided to postpone making a decision on this until more results are available.  Recommendation:  Continue discussion in future meetings |

The way forward is to continue discussion in the 2nd round.

**Proposed agreement #9:**

**keep the current spectral flatness requirements for large PRB allocations (e.g. ≥ 16 PRBs as in section 6.4.2.4.1, TS 38.101-1.**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Qualcomm | See answer to section 7 |
| OPPO | Ok with proposed agreement |
| IITH, IITM, CEWIT, Reliance Jio, Tejas Networks | Same answer as section 7. |

# 10. Spectral flatness requirements (PRB <16)

The latest email discussion summary [1] captures the issue in the following way:

|  |
| --- |
| **Issue 1-2-4:  *Spectral flatness requirements (PRB <16)***  Most companies agreed that tighter spectral flatness requirements for small PRB allocations to optimize net gain needs further discussion  One company wanted to adopt tighter spectral flatness requirements  Recommendation  Propose study of PRB sensitive filtering in WF |

The way forward is to continue discussion in the 2nd round.

**Proposed agreement #10:**

**Discuss further tighter spectral flatness requirements compared to current specification for small PRB allocations to optimize net gain.**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Qualcomm | Agree with proposed agreement |
| OPPO | Ok with proposed agreement |
|  |  |

# References

[1] R4-2114747, “Email discussion summary for [100e][147] FS\_NR\_Opt\_pi2BPSK”, Qualcomm