3GPP TSG RAN #99
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RP-230358
Agenda Item: 9.3.2.7
Document for: Decision

Discussion on Rel-18 NR NTN

NTT DOCOMO, INC.

Background

WID description (RP-223534)

4.1.1 Coverage enhancement

The Rel-18 NTN objectives are focused on the applicability of the solutions developed by general NR coverage enhancement to NTN, and identifying potential issues and enhancements if necessary, considering the NTN characteristics including large propagation delay and satellite movement. Only NTN-specific characteristics are to be included in this coverage enhancement work, otherwise it should be part of another WI (e.g., UL enhancement of coverage).

The following sentence will be revisited in RAN#99 as part of the DL enhancements discussion:

"The evaluation should also take into account any related regulatory requirements, e.g., ITU limitation of power flux density." No work on this topic will take place in RAN WGs before the discussion on DL enhancements in RAN#99.

The following reference scenario is considered for the definition of uplink coverage enhancements for NTN: parameter set-1 for LEO-1200 satellite operating at Line of Sight (LOS) and commercial smartphones with -5.5 dBi antenna gain and 3 dB polarisation loss (per antenna port).

Note: It is understood that the enhancements defined for LEO can also apply to GEO and MEO scenarios as appropriate. No additional work is expected for MEO/GEO.

The targeted services are VoIP using AMR 4.75 kbps and data transmission services with Low data rate of 3 kbps.

The detailed objectives are for NTN:

- To specify PUCCH enhancements for Msg4 HARQ-ACK (e.g. repetition) [RAN1, RAN4]
- To specify if necessary, enhancements to the Rel-17 procedures for DMRS bundling for PUSCH taking into account NTN-specifics (e.g. time-frequency pre-compensation) [RAN1]

Discussion

- <u>DL enhancements discussion</u>
  - Although there was discussion on DL enhancements for NTN coverage enhancements, no WID revision was not endorsed for DL enhancements since companies are not aligned regarding ITU regulation perspectives
  - In our view, it is difficult to add DL enhancements in this WI scope at least from perspective of remaining available time, e.g.,
    - » Only 0.5 TU is allocated for RAN1, but progress of UL coverage enhancement and NW verified UE location is not so good

Proposal: Do not include DL coverage enhancements in Rel-18 NR NTN enhancements WI

Discussion

- Clarification of 'PUCCH enhancements for Msg4 HARQ-ACK'
  - At previous RAN1 meetings, it was discussed which PUCCH should be enhanced since RAN1 spec is not using the terminology, but there was no consensus
  - The following possibilities were raised:
    - » Option 1: PUCCH transmission when dedicated PUCCH resource configuration is not provided
    - » Option 2: PUCCH transmission when PUCCH resource is indicated by a DCI format 1_0 with CRC scrambled by TC-RNTI
  - In our view, Option 1 should be adopted
    - » In Rel-15, when RAN1 had discussion and made specification on PUCCH relevant to initial access procedure, the terminology of Option 1 was used. There seems no reason to change this experienced direction
    - » Timing of when dedicated PUCCH-Config is provided is up to NW implementation though Msg4 PDSCH can include the configuration; If the configuration is not provided via Msg4 PDSCH, feedback of one or more subsequent PDSCH is conveyed on a common PUCCH. The coverage issue should be addressed together

Proposal: For coverage enhancement, 'PUCCH enhancements for Msg4 HARQ-ACK' in WID is replaced to 'PUCCH enhancements for PUCCH transmission when dedicated PUCCH resource configuration is not provided'

- ***It is understood that this update is also applied to existing agreements/conclusions***

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