3GPP TSG-RAN WG1 Meeting #50bis **R1-074383**
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Source: **Nokia Siemens Networks, CATT, Ericsson, Huawei, Nokia**
Title: **Proposed way forward for CQI reporting**
Agenda Item: **7.2.4**
Document for: **Discussion and Decision**

1. Introduction

RAN1#50 agreed to the following way forward for the CQI reporting needs:

- CQI, PMI and rank can be transmitted on PUCCH and PUSCH
  - PUSCH is used when and only when UE is scheduled in uplink.
    - CQI, PMI and rank can be transmitted on PUSCH even without simultaneous data transmission.
    - Multiple message sizes will be defined
      - No blind decoding for Node B.
  - PUCCH is used when and only when UE is not scheduled in uplink.
- Reporting can be periodic or aperiodic.
  - Periodic reporting
    - Periodic reports are transmitted on PUSCH when UE is scheduled in uplink and on PUCCH when UE is not scheduled in uplink.
    - The eNB configures a set of sizes and formats of the report
      - Size and format of the report may be dependent on whether it is transmitted over PUCCH or PUSCH
    - The possibility of linking the configuration of a periodic reporting cycle to a persistent scheduling cycle should be considered.
    - The possibility of masking the periodic report with DTX/DRX patterns should be considered
  - Aperiodic reporting is FFS
    - Aperiodic reports are scheduled by eNB in downlink (details of signaling FFS) and transmitted by the UE on PUSCH (or PUCCH is FFS)
    - Aperiodic report size and message format can be flexible in terms of size and contents but format needs to be configured by the eNB and reported to UE (e.g. via RRC).
    - In case both periodic and aperiodic reporting would occur in the same subframe, only the aperiodic report is transmitted in that subframe.

- The following types of multi-band CQI reports are under consideration (where sub-band sizes (number of PRBs) are configured by the network):
    - "eNB-selected sub-bands reported in one PUSCH subframe"
        - Includes the possibility to select all sub-bands.
        - One value per codeword (or average over two codewords) is reported for each selected sub-band.
        - Differential representation
    - "eNB-selected sub-bands reported using one or multiple PUCCH subframes"
        - Includes the possibility to select all sub-bands.
        - One value per codeword (or average over two codewords) is reported for each selected sub-band.
        - Differential representation
    - "UE-selected sub-bands over PUCCH or PUSCH"
        - UE reports which sub-bands it has selected
        - Differential representation is not precluded
        - For selected sub-bands the following alternatives are considered for the report:
            - One value per codeword (or average over two codewords) per selected sub-band
            - Average over all selected sub-bands
        - Some additional information should also be possible to be reported.
            - Wideband CQI information, or
            - Information for the other (not selected) bands (e.g. an average value).
- CQI reporting metric is TBD
    - RAN4 has proposed a CQI definition that relates directly to link adaptation parameters like TBS or MCS [1].

2. Proposed way forward

In addition to the points agreed in RAN1#50 we propose to capture the following aspects into the way forward for CQI reporting:

- CQI reporting metric is directly linked to adaptation parameters like TBS or MCS.
- Reporting can be periodic or aperiodic.
    - Aperiodic reporting
        - Aperiodic reports are scheduled by eNB in downlink by requesting them as part of UL grant and transmitted by the UE on PUSCH.
        - Aperiodic report size and message format can be flexible in terms of size and contents but format needs to be configured by the eNB and reported to UE (e.g. via RRC).
        - In case both periodic and aperiodic reporting would occur in the same subframe, only the aperiodic report is transmitted in that subframe.
        - Minimum reporting periodicity for CQI and PMI is one subframe
- Subframe concatenation should not be used on PUCCH for the purpose of frequency selective reporting
    - Minimum reporting periodicity for CQI and PMI on PUCCH is equal to number of concatenated subframes corresponding to one report (i.e., may be one subframe if subframe concatenation is not supported)