3GPP TSG RAN Meeting #95-e

RP-220542

Electronic Meeting, March 17th - 23rd, 2022

Agenda Item 9.1.4.5

Qualcomm

Views on OTA testing enhancements

Qualcomm Incorporated

OTA Testing for FR2 Devices with Multiple Rx-chain and simultaneous reception/transmission

- Previous releases of MIMO enhancements have introduced different features based on simultaneous reception with multiple receiver chains(“multi-panel” reception) from different angles
- Current 3GPP FR2 testing solutions do not support testing of devices that can receive or transmit simultaneously from/in different directions
- In order to enable testing of such advanced MIMO features, development a new testing methodology is needed
- New test methodology should be versatile enough such that testing of simultaneous reception from different angle pairs is possible
  - The restrictions on testable angle pairs should be minimized (ideally, any angle pair should be testable)
- Simultaneous transmission in different directions should also be considered for future compatibility
- Test methodology should also enable testing of 4 layers (2 layers in each direction with different polarizations)

Dynamic OTA testing for FR2/FR2x

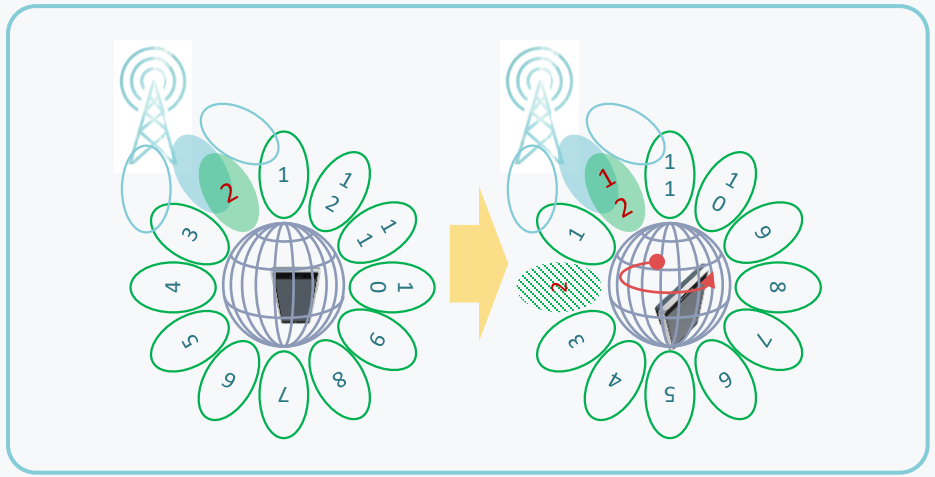
Advanced testing for beam management

- This item is very important to address the industry need for more advanced UE testing in environments that are closer to field operation
  - Fast changes in signal directions and/or fast channel variation
  - Current tests for RRM/beam management are very simplistic, with most 2 signals coming from different directions and long dwell time(time for UE to acquire signals)
  - We believe such tests are needed during device development even if there are no 3GPP conformance tests
- The most important part of this item is to develop a standardized test environment and test methodology that benefits everyone
  - Testing solutions are very expensive without having a standardized test setup that TE vendors can build
    - Only custom test solutions would be available, these are very expensive
  - There are already some ongoing discussions in other for a (e.g. IMT-2020PG – TTWG_210017), would be good if 3GPP maintains leadership in defining testing solutions for the eco-system
- “Multi-panel” UEs should also be considered for forward compatibility (see previous slide)
- This item is to investigate dynamic OTA test method but not to introduce new RAN4 requirements in Rel-18.
  - The test method specified in Rel-16 MIMO OTA SI will be taken into account.

Dynamic OTA testing for FR2

Scenarios for Dynamic FR2 OTA Testing (not covered by current test setup)

- UE orientation rotation-based Scenario



The following can be further considered

- Multi-cell
- Multi-panel gNB/UE
- Travel-based dynamic environment scenario ➔ The beam(s) from gNB(s) are dynamic on the basis of UE orientation-based scenario

- Examples of potential Figure of Merit
  - Whether UE can maintain the established link without or with very infrequent triggering of “Beam failure detection and Link recovery” procedure
  - Averaged RSRP/RSRQ and/or Throughput
  - Performance deviation in terms of
    - SSB and/or CSI-RS based RSRP/RSRQ
    - PDSCH Throughput

Dynamic OTA testing for FR2

- Work is expected to be complex and last for a relatively long time
  - It is important to start as soon as possible considering that even after a RAN4 study is concluded, more time is still needed until the actual testing solution is implemented and commercially available
- Work can be started only with the rotation based scenario which has lower complexity

Qualcomm

Thank you

Follow us on:

For more information, visit us at:

www.qualcomm.com & www.qualcomm.com/blog

All data and information contained in or disclosed by this document is confidential and proprietary information of Qualcomm Technologies, Inc. and/or its affiliated companies and all rights therein are expressly reserved. By accepting this material the recipient agrees that this material and the information contained therein will not be used, copied, reproduced in whole or in part, nor its contents revealed in any manner to others without the express written permission of Qualcomm Technologies, Inc. Nothing in these materials is an offer to sell any of the components or devices referenced herein.

©2018-2020 Qualcomm Technologies, Inc. and/or its affiliated companies. All Rights Reserved.

Qualcomm is a trademark of Qualcomm Incorporated, registered in the United States and other countries. Other products and brand names may be trademarks or registered trademarks of their respective owners.

References in this presentation to “Qualcomm” may mean Qualcomm Incorporated, Qualcomm Technologies, Inc., and/or other subsidiaries or business units within the Qualcomm corporate structure, as applicable. Qualcomm Incorporated includes Qualcomm’s licensing business, QTL, and the vast majority of its patent portfolio. Qualcomm Technologies, Inc., a wholly-owned subsidiary of Qualcomm Incorporated, operates, along with its subsidiaries, substantially all of Qualcomm’s engineering, research and development functions, and substantially all of its product and services businesses, including its semiconductor business, QCT.