



3GPP TSG-RAN WG4 Meeting #82bis
Spokane, USA, April 3 - 7, 2017
Agenda Item: 12

R4-1702925

Motivation for a WI proposal:
**CRS-IM Performance Requirements for
Single RX Chain UEs**

Intel Corporation

Work Item Justification

Single RX Chain Devices

Many LTE IOT devices are expected to be equipped with single RX chain in order to achieve

- Cost reduction
- Reduced power consumption
- Smaller device size

Single RX chain IOT devices use cases:

- Low cost IOT (MTC, eMTC, NB IOT): Low data rate, low power, low complexity/cost
MTC use cases such as smart metering, building automation, smart city, etc
- Wearables (FeMTC, Cat 1 UE + 1RX): More high end use cases, which still require reduced power consumption, but support higher data rate and have more flexibility in terms of the baseband complexity.

Work Item Justification

Advanced Receivers for Single RX Chain

In the LTE Rel.11-14, multiple enhancements of UE advanced receiver for the interference-limited environments were introduced

- Key enhancements: LMMSE-IRC, CRS-IM, SU-MIMO IS/IC, NAICS, and others.
- Features introduced for high-end UEs with either 2 or 4 RX chains

Single RX chain UEs

- All existing performance requirements for 1 RX chain UEs are defined for the noise limited scenarios and are based on MRC processing.
- Advanced IS/IC receivers can be used to improve the performance in the interference-limited conditions.
- Wearable devices are capable to support increased baseband complexity comparing to Low-cost MTC and can potentially support some IS/IC features.

Work Item Justification

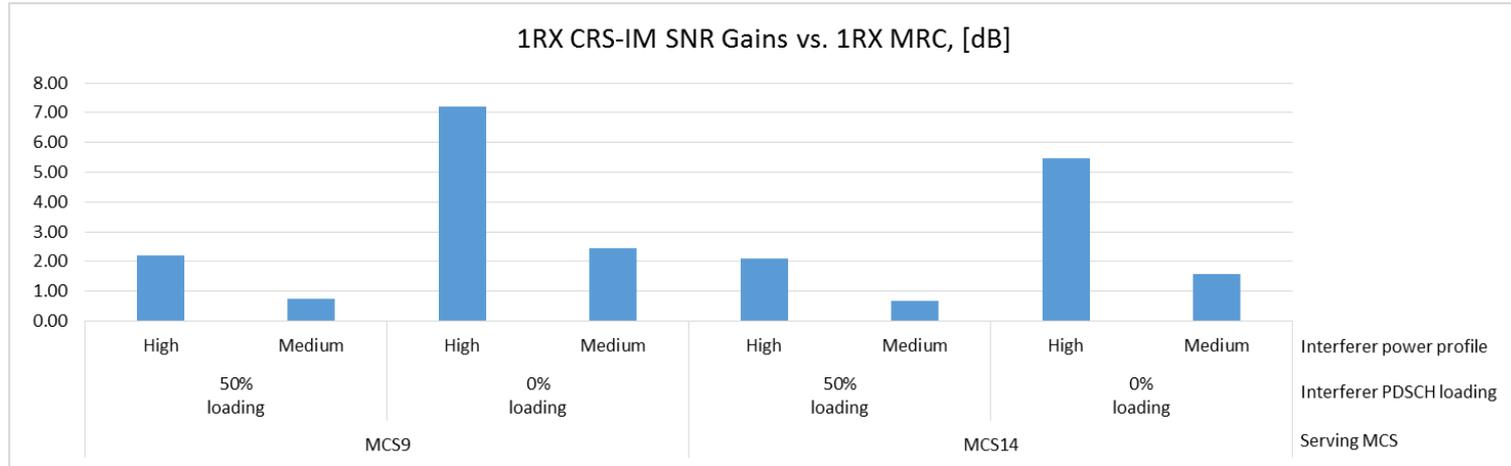
CRS-IM for Single RX chain

CRS-IM can be used for Single RX chain UEs to improve performance in the interference-limited scenarios

- Single RX chain UEs cannot apply the linear interference suppression (e.g. MMSE-IRC).
- Non-linear interference suppression and cancellation (IS/IC) techniques can be used to improve the performance in the interference-limited conditions.
- CRS-IM is the main candidate to improve the 1RX chain UEs performance in the interference-limited scenarios considered in the Rel-13 CRS-IM and Rel-14 Enhanced CRS-IM work items
- Comparing to other IC techniques, CRS-IM functionality has relatively limited complexity and power consumption impacts

Work Item Justification

CRS-IM for Single RX chain



CRS-IM can provide substantial performance gains for the 1 RX chain UEs in the interference-limited scenarios with the dominant CRS interference

Work Item Justification

Summary

Conclusions

- Single RX capable UEs are emerging in the market
- Inter-cell interference is one of the key factor to limit the DL performance
- CRS-IM receivers can provide substantial performance improvement for the 1RX capable UEs.

Proposal

- Organize Rel-15 RAN4-led WI to introduce CRS-IM performance requirements for the single RX chain UEs with the focus on the wearable use cases

Work Item Objectives

Investigate feasibility of CRS-IM receivers for the UEs equipped with 1 RX chain

- Identify target scenarios including deployment scenarios, interference models, and others.
 - Reuse Rel-13/14 CRS-IM assumptions as the starting point.
- Identify reference CRS-IM receiver structure assumptions including at least number of cancelled interference cell(s)
- Evaluate the CRS-IM performance benefits for the Single RX chain UEs

Specify UE demodulation and CSI reporting performance requirements for the UEs equipped with 1 RX chain

The work should be done under the following assumptions:

- Target device types
 - Rel-14 “Cat 1 UE + 1RX” capable devices
 - Rel-14 FeMTC capable devices
- Consider both 2 and 4 CRS APs scenarios
- Focus on the Non-colliding CRS scenarios

