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Proposal for new work on performance requirements of MMSE-IRC receiver at LTE BS

China Telecom

Outline

- Motivation
- MMSE-IRC receiver for LTE BS
  - Concept and benefits
  - Proposal

Motivation

Inter-cell interference in LTE UL

- In typical LTE systems, frequency reuse factor of one is utilized. And inter-cell interference has a substantial impact on uplink performance.
- For heterogeneous network with co-channel deployment of Macro and Pico, the interference becomes even stronger due to large number of Pico nodes deployed.

Requirements on UL spectral efficiency improvement

- Mobile data traffic is expected to increase 13-fold between 2012 and 2017[1], in which social network and P2P video/file sharing applications take a significant slice of traffic.
- With the wider usage of these two applications, UL traffic load is becoming much heavier.
- Hence, uplink spectral efficiency improvement is an essential and practical requirements for operators.

Efficient interference handling is of great importance for uplink cell-edge and cell-average spectral efficiency improvement.

MMSE-IRC receiver for LTE BS (1/2)

- MMSE receiver without IRC
  - Currently in RAN4, the demodulation performance requirements for uplink channels are specified based on MMSE receiver without IRC (interference rejection combining) capability, where the covariance matrix of inter-cell interference is simply modeled as AWGN.
- MMSE receiver with IRC
  - Can suppress inter-cell interference as well as intra-cell interference.
  - Significant spectral efficiency gain in both cell-edge and cell-average is expected compared with the current MMSE receiver in RAN4.
    - ✓ Some simulation and field test results are provided in [2] to show the performance gain of MMSE-IRC over MMSE without IRC for LTE UL.
  - Implementation complexity increase is moderate, since this kind of baseband processing techniques is quite mature.
  - It has been widely used in RAN1 performance evaluation, e.g., for the evaluation of advanced E-UTRA in TR 36.814 [3].

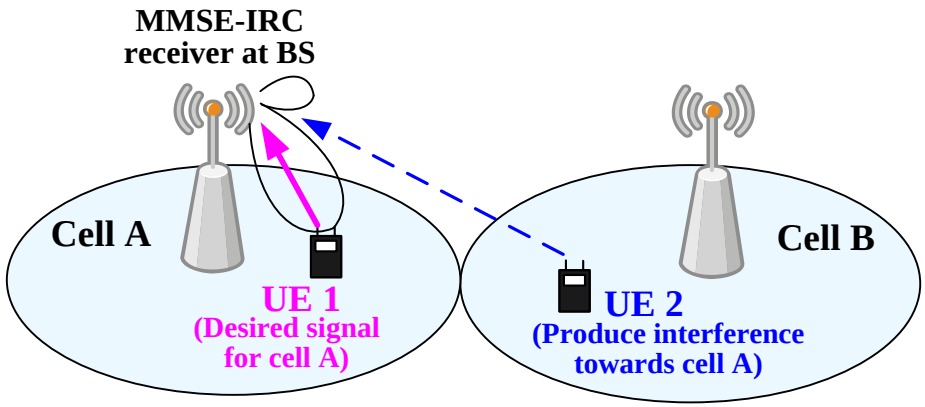

Figure. Illustration of MMSE-IRC at BS

MMSE-IRC receiver for LTE BS (2/2)

- Proposal:
  - To consider starting new work on performance requirements of MMSE-IRC receiver at LTE BS.
  - Note: no standard impact on RAN1, RAN2 and RAN3 is expected.

References

[1] Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017, February 6, 2013.

[2] R4-133923, Simulation and field test results of 8 MMSE-IRC receiver at LTE BS, RAN4 #68, August 2013.

[3] TR 36.814 V9.0.0, Further advancements for E-UTRA physical layer aspects, Mar 2010.

Thank You!