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Motivation for WI: Mobility Enhancements for NR

Section 9.1.2

Intel Corporation

Mobility enhancements WID

Current status in NR Rel-15

- RAN2 has discussed basic handover for NR SA.
  - It is applied to high frequency (above 6GHz) as well as low frequency (sub-6GHz) because protocol stack is agnostic to frequency carrier.
  - Basic HO is quite similar to LTE handover procedure.
  - Only enhancement is dedicated RACH in compare to LTE.
- A number of optimization proposals have been submitted but not discussed in detail. For example:
  - RACH-less handover: the interruption gain can be achieved by dedicated RACH introduced in NR.
  - Make-Before-Break (MBB): not truly MBB, if dual radio handover is introduced, this may not be needed.
  - Dual connectivity handover: Can achieve 0ms interruption time.
  - Conditional handover: may solve interference problem caused by target cell when the UE receives HO command from serving cell. Number of issues like ping-pong and signalling overhead needs to be resolved.
  - RRC reestablishment enhancements: fast RLF recovery procedure to reduce recovery time and provide SI of neighbouring cells.

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Potential challenges in mmWave mobility

- We observe large pathloss fluctuation in beams or between LOS and non-LOS. (R2-165001, Intel)
  - Beam creates more than 7dB in measured signal may increase the challenge of handover decision in LOS environment.
  - The serving signal in non-LOS can be about 40dB lower than the LOS case.
- It may result in higher handover failure/large pingpong rate.

NR requirement

- 0ms interruption is one of the requirement to provide seamless handover UE experience
- Considering HO performance would be degraded in high frequency and to achieve NR requirement for ultra reliable and low latency such as URLLC, HO optimization needs to be considered in Rel-15/16.

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Objective of this work item are as follows:

- To define solution for intra-/inter-frequency handover by using dual-connectivity to achieve 0ms interruption time. [RAN2/RAN1/RAN3/RAN4]
- To define solution to improve handover performance in NR especially in high frequency carriers by reducing handover failure rate and handover delay. [RAN2/RAN3/RAN4]
  - Solution can consider both NW based HO and UE based HO without increasing RRC signaling overhead.
- To define a more accurate mobility state estimation mechanism considering different cell size e.g. beamforming environment. [RAN2]
- To define solution for fast handover failure recovery. [RAN2/RAN3]

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