

3GPP TSG RAN #65  
Edinburgh, Scotland, Sep. 9 - 12, 2014

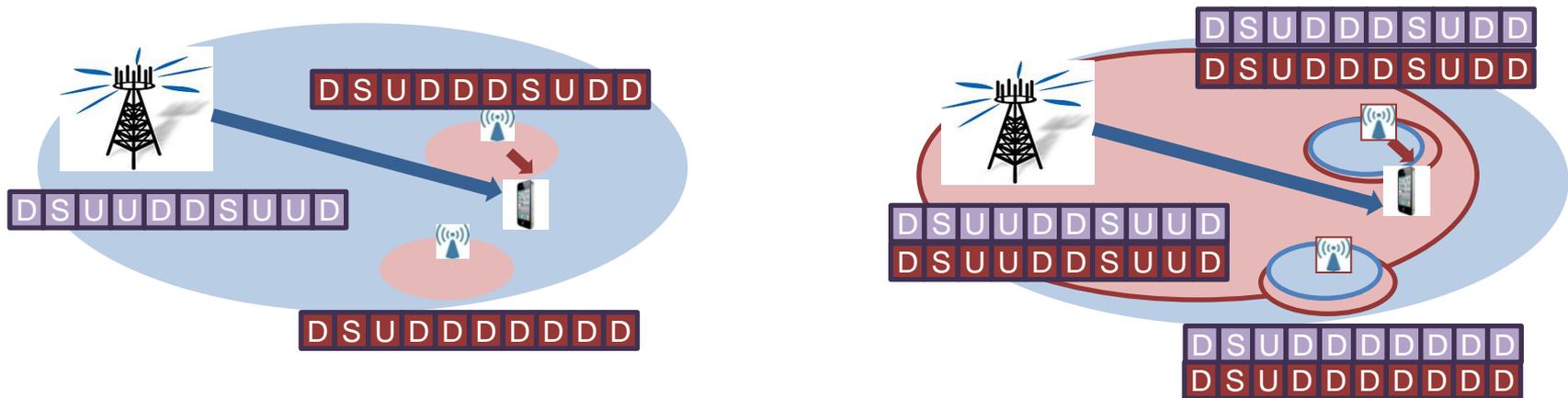
RP-141357

# Motivation for further enhancements on LTE carrier aggregation

CATT

- Motivations

- Operators may own a large trunk of spectrum in one band
  - Macro-small cell adjacent channel deployment with different UL/DL configurations desirable
  - For co-existence/feasibility, macro DL should not collide with small cell UL
- Only serving cells of same UL/DL configuration in one band can be aggregated by UEs
  - Benefits of CA not achievable for UEs with the macro-small cell adjacent channel deployment with different UL/DL configurations
- Transmission direction of half duplex UE follows Pcell subframe direction
  - Either macro is not configured as Pcell which loses the benefits on mobility, or
  - Macro is configured as Pcell with reduced DL data rate since small cell has more DL subframes



- Objectives: For the macro-small cell adjacent channel deployment of one operator, assuming 1) different UL/DL configurations in the macro and small cells, 2) macro DL not colliding with small cell UL, and 3) half duplex UE
  - Specify mechanism(s) such that a UE can aggregate LTE TDD serving cells in one band with different UL/DL configurations [RAN1]
  - Strive to allow UEs utilizing all DL subframes of all aggregated serving cells for PDSCH reception, with macro configured as PCell [RAN1]
  - Identify if PUCCH power control enhancement(s) is necessary, and if identified necessary, specify PUCCH power control enhancement(s) [RAN1]

- Motivations:
  - Potential more spectrum to be aggregated by a UE for LTE
    - Spectrum re-farming and new spectrum allocations for LTE
    - Adapting LTE into unlicensed spectrum
  - Limitations of current CA mechanisms
    - Only allows aggregating a maximum of 5 FDD serving cells or 5 TDD serving cells with other than UL/DL configuration 5
    - Only allow aggregating a maximum of 2 TDD serving cells with UL/DL configuration 5
  - Capability of aggregating more serving cells in downlink is critical to address the downlink centric traffic
- Objectives: Specify necessary mechanism(s) to enable a UE to aggregate up to 8 DL serving cells, including
  - Specify HARQ-ACK enhancements on PUCCH/PUSCH to support HARQ-ACK feedback up to 8 FDD and/or TDD serving cells with any existing UL/DL configurations [RAN1]
  - Specify other necessary mechanism(s) for a UE to aggregate up to 8 DL serving cells [RAN1, RAN2]

- Motivations
  - In macro/small cell deployments, it can be more energy efficient and interference friendly if a UE transmits UL to a small cell configured as SCell while macro cell is Pcell for mobility handling
- Objectives:
  - Specify mechanism(s) for DL PCell and UL PCell separation for a UE
    - The mechanism(s) should allow UL PCell change without DL PCell change
  - The above objectives should consider both LTE FDD and TD-LTE