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Views on Rel-18 Flexible Duplex

RWS-210219

Agenda Item: 4.1
3GPP TSG Rel-18 Workshop
Electronic Meeting, June 28 - July 2, 2021

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- As specified in SID of Rel-17 coverage enhancement (RP-193240 [1]),
  - Coverage is one of key factors for commercializing networks due to its impact on cost
  - Compared to LTE, NR system with higher frequency band suffers higher path-loss
  - Both in FR1 and in FR2, coverage is critical issue to be solved

- On the other hand, DL centric TDD configuration (e.g., DDDSU) is not suitable for enhancing uplink coverage,
  - Overall transmission power is small in several bands where the maximum power is limited in unit of time
  - Joint channel estimation specified in Rel-17 will require consecutive uplink slots
- Configuring UL centric configuration just for uplink coverage compensation is not likely
  - Typically, downlink traffic would be much more than uplink traffic

[1] RP193240, New SID on NR coverage enhancement, 3GPP TSG RAN Meeting #86, Sitges, Spain, December 9 – 12, 2019

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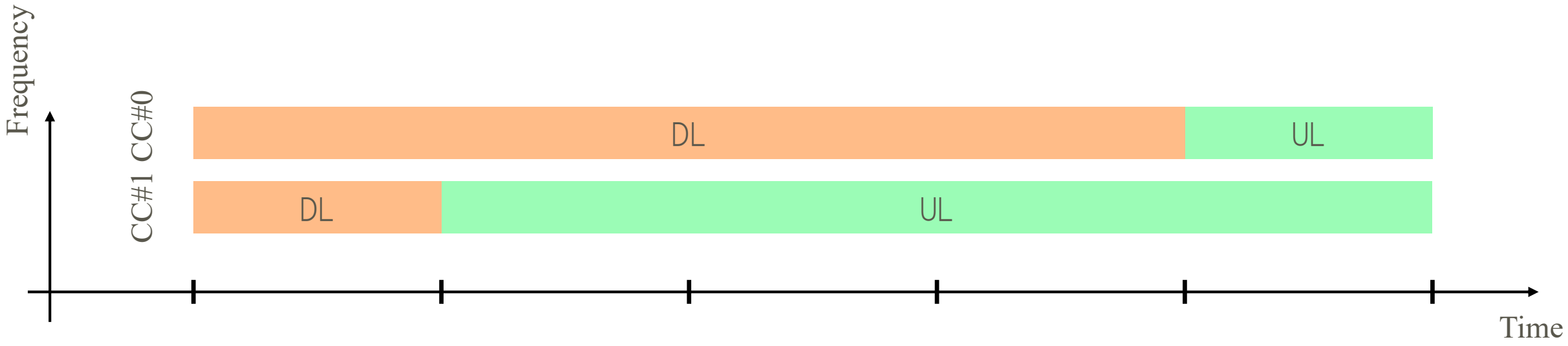
- Up to Rel-17, carrier aggregation with different TDD configuration is possible to address the above two issues
  - Pcell (CC#0) is configured with DL centric configuration to provide general downlink traffic
  - Scell (CC#1) is configured with UL centric configuration to provide enhanced coverage
- However, CA-based solution has some disadvantages
  - Uplink CA must be operated at UE (e.g., 2 RF chains are required)
  - A gap between two carriers is always lost
  - Cross-carrier HARQ is not supported
  - Frequency diversity gain is limited



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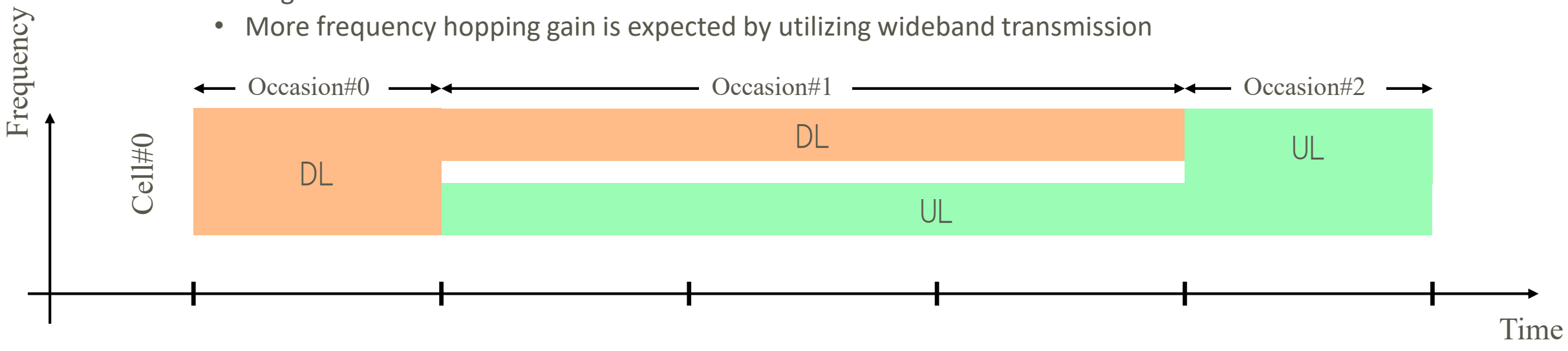
- Flexible duplex from gNB perspective should be studied in Rel-18
  - UE is not necessary to implement simultaneous Tx/Rx in a serving cell (i.e., UE is only required to adapt filter bandwidth across occasions)
    - In Occasion#0 where only DL is configured,
      - Higher DL throughput than CA case is expected by utilizing all resources including the gap for CA
      - More frequency diversity gain is expected by utilizing wideband distributed transmission
    - In Occasion#1 where DL and UL is configured,
      - The gNB can serve additional downlink traffic
      - Coverage gain with respect to joint channel estimation and transmission power increase is expected
    - In Occasion#2 where only UL is configured,
      - Higher UL throughput than CA case is expected by utilizing all resources including the gap for CA
      - Single SRS transmission can cover wideband
      - More frequency hopping gain is expected by utilizing wideband transmission



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- Flexible duplex from gNB perspective is studied
  - From the UE perspective, only single TDD configuration may be configured in the cell
  - Several benefits of flexible duplex can be seen from CA-based solution
    - UL coverage improvement by utilizing UL centric TDD configuration
    - Higher DL/UL efficiency by utilizing full bandwidth
    - More frequency diversity by utilizing wideband transmission

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