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3GPP TSG RAN Rel-18 workshop
Electronic Meeting, June 28 – July 2, 2021

RWS-210397

Full Duplex Cell Operation in NR

Agenda Item:	4.3
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Motivation

NR Dynamic Time Division Duplexing (TDD) operation does not sufficiently reduce communication latency in unpaired spectrum

- Longer latency compared to FDD in paired spectrum, when DL/UL traffics are asymmetric
- Unavailable UL/DL resources limit ability to meet reliability and latency requirements for URLLC
  - e.g., HARQ-ACK feedback dropped/deferred and PUSCH/PUCCH repetition delayed due to unavailable UL resources
  - e.g., CSI reporting dropped due to unavailable CSI measurement resources or unavailable UL resources
- Inefficient/difficult to accommodate asymmetric eMBB DL/UL and URLLC traffic within one cell with UL/DL switching in every slot

Service performance requirements for motion control (TS 22.104 V18.0)

Communication service availability: target value [%]	End-to-end latency: maximum	Message size [byte]	Transfer interval: lower bound	Transfer interval: upper bound	Survival time	UE speed	# of UEs	Service area (note)
99.999 to 99.999 99	**< transfer interval value**	50	**500 µs – 500 ns**	**500 µs + 500 ns**	**500 µs**	≤ 72 km/h	≤ 20	50 m x 10 m x 10 m
99.999 9 to 99.999 999	**< transfer interval value**	40	**1 ms – 500 ns**	**1 ms + 500 ns**	**1 ms**	≤ 72 km/h	≤ 50	50 m x 10 m x 10 m

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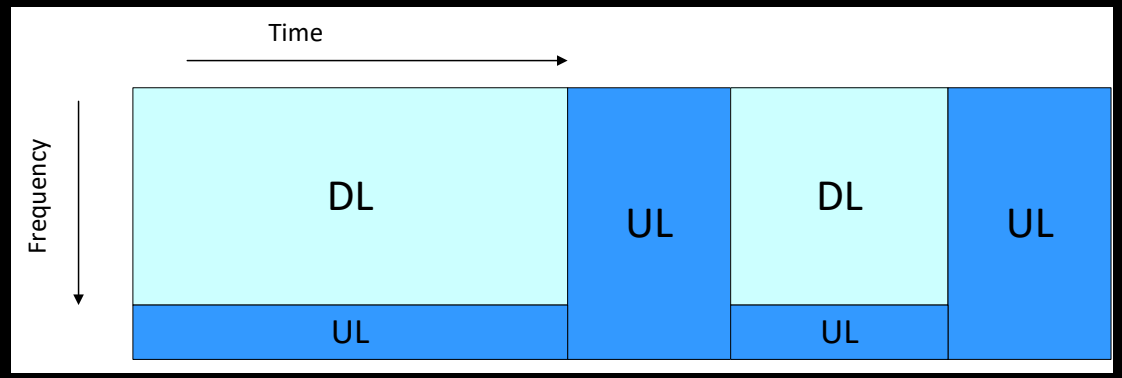
Full Duplex Cell Operation

Full duplex operation at gNB can be considered to enable **controlled UL/DL transmission in a legacy DL/UL region** for latency reduction and throughput increase

- Potential Scenarios
  - Both FR1 and FR2
  - Simultaneous transmission and reception within a carrier by gNB
    - **Case 1: Non-overlapping frequency resources of UL and DL within a carrier**
    - **Case 2: Overlapping frequency resources of UL and DL within a carrier**
  - No simultaneous transmission and reception within a carrier by UE in Rel-18
    - UL/DL switching delay depending on UE RF architecture, frequency resource utilization, and/or UE operation mode
    - Potential full duplex operation at UE can be considered in future releases (beyond Rel-18)

- Potential Challenges – interference handling
  - Self-interference at gNB
  - gNB-to-gNB interference
  - UE-to-UE interference (intra-cell, inter-cell)



Example full duplex cell operation to accommodate UL opportunities in a DL-traffic dominant cell

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Proposed Study Objectives

Study feasibility of full duplex cell operation

- Study required self-interference cancellation level at gNB for different operation scenarios
- Study solutions for cross-link interference management with full duplex cell operation

Study potential specification enhancements for full duplex cell operation

- Study mechanism to enable/disable full duplex cell operation
- Study potential coexistence issues with legacy UEs
- Study enhanced channel access procedures (unlicensed) with full duplex operation
- Study potential impact on RAN4 RF requirements

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thanks.

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