



China Mobile



Motivation of study for full duplex in NR

CMCC



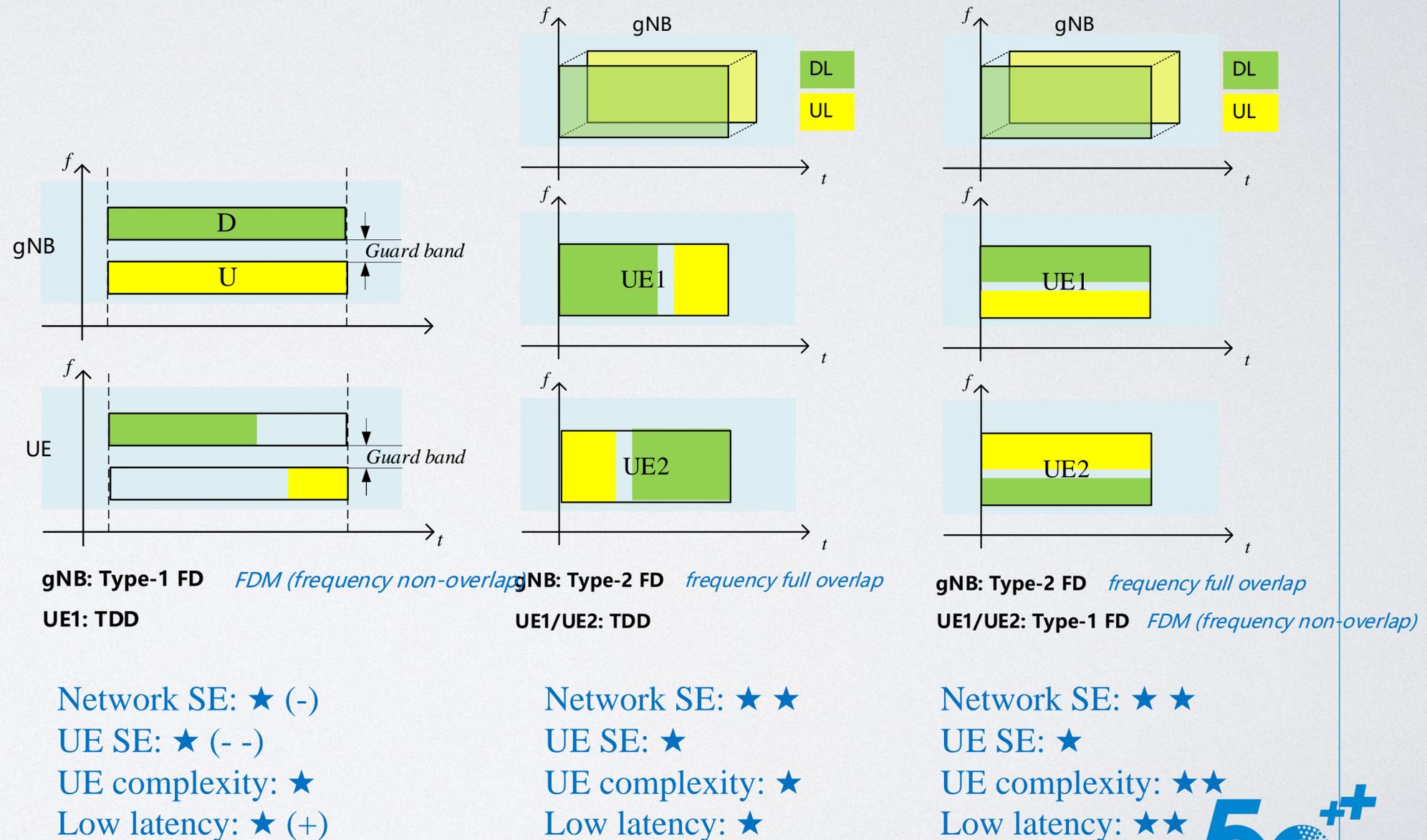
Potential benefits of full duplex

• Potential benefits

- Higher cell spectrum efficiency
 - up to 2x in theory
- Lower latency
 - More suitable to dynamic and asymmetric UL and DL traffic

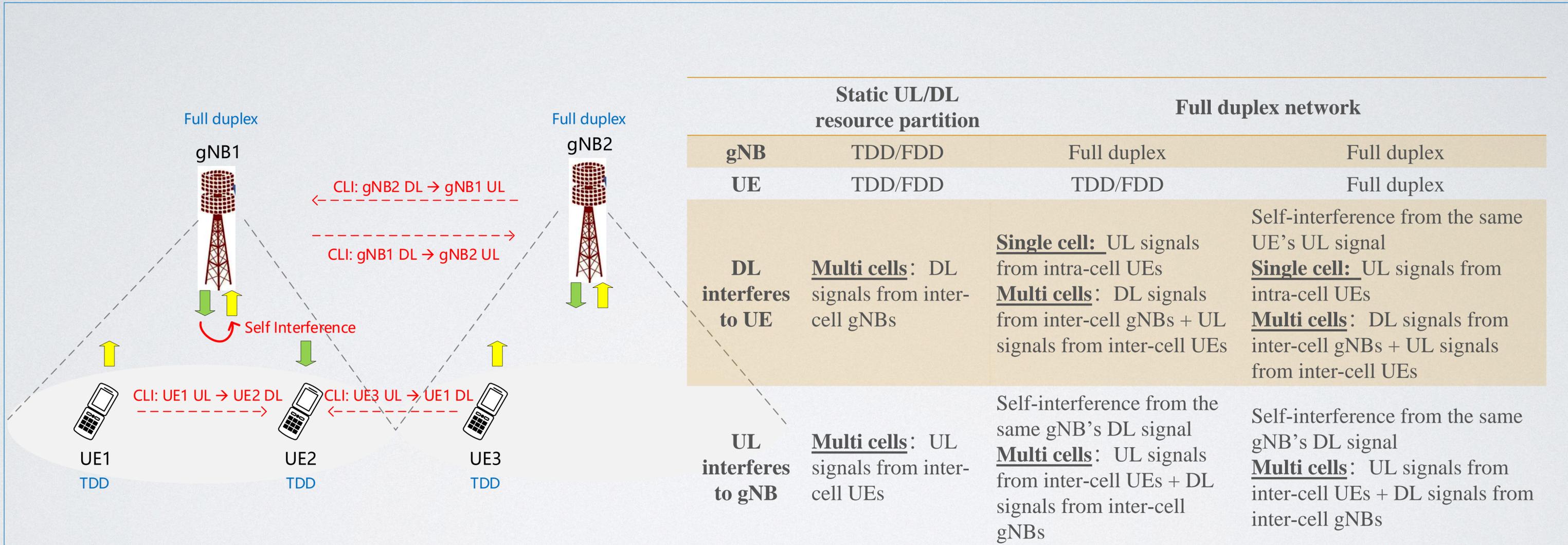
• Duplex mode

- Regarding NW/UE spectrum efficiency, the duplex mode combinations of **gNB with Type-2 FD (frequency full overlap full duplex)** and **UE with TDD/FDD/Type-1 FD (FDM full duplex)** are preferred.





Challenge of full duplex: self-interference & CLI



Compared with static UL/DL resource partition scheme, full duplex network may suffers from serious **self-interference & CLI (cross-link interference)**.





Lab test for self-interference cancellation

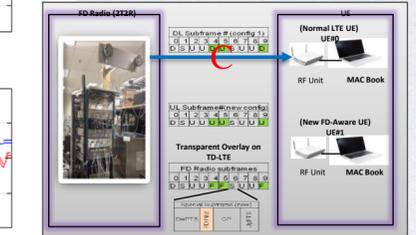
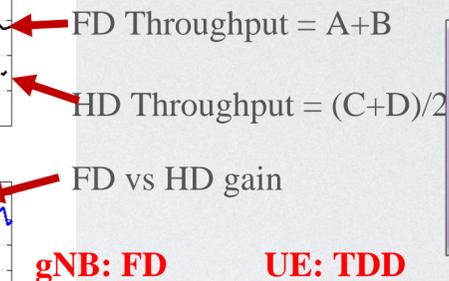
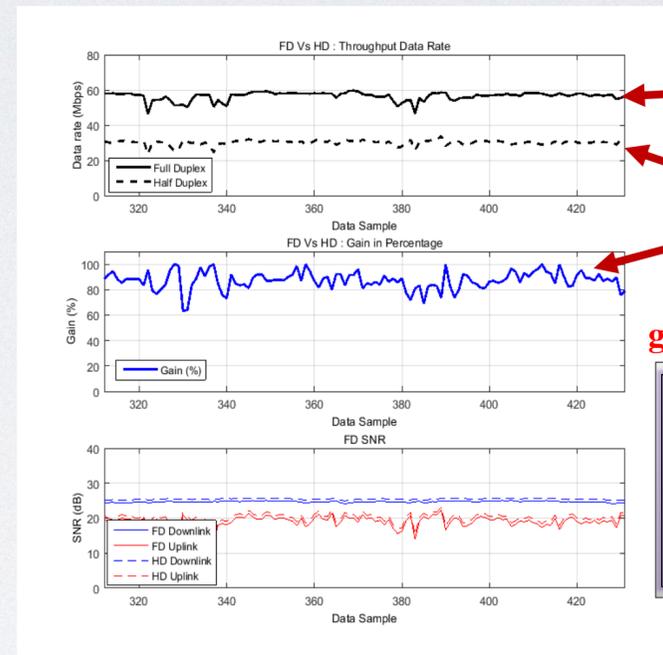
Up to **118dB self-interference (I_{self}) cancellation capability** was achieved in lab for 2T2R MIMO.

	Tx power at gNB (dBm @100MHz)	Noise figure (dB)	Noise power (dBm @100MHz)	I_{self} over Noise (dB)
Macro	53	4	-90	25
Micro	47	5	-89	18
Pico	31	7	-87	0

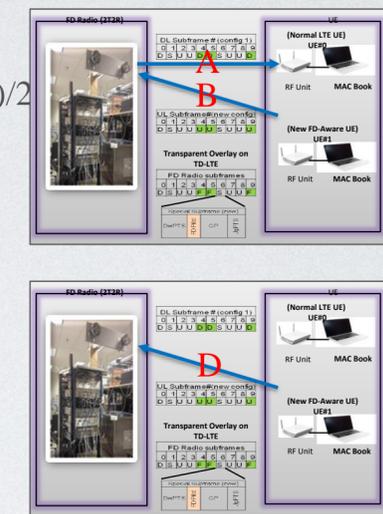
$$I_{self} \text{ over Noise (dB)} = \text{DL transmission power (dBm)} - \text{cancellation capability (dB)} - \text{Noise power (dBm)}$$

- **Observation:** Full duplex scheme seems feasible in single cell scenario with lower transmission power.
 - Lab test shows **significant throughput gain (about 90%)** of full duplex scheme in a pico cell with 31dBm transmission power.
 - Feasibility of full duplex network (i.e., multi cells) needs more investigation and evaluation.

Pico (Tx power: 31dBm, 2T2R)



Self-interference cancellation capability \approx 118dB





Potential study objectives

- **Feasibility study of full duplex operation**
 - Evaluation methodology, including,
 - Deployment scenario (e.g., Rural, Urban, Indoor, Isolated)
 - Frequency range (e.g., FR1, FR2)
 - Antenna configuration (e.g., Single-/multi-panel, MIMO order)
 - gNB/UE's duplex mode (e.g., TDD/FDD. Type-1 (FDM) FD, Type-2 (Frequency full overlap) FD)
 - Technique of comparison (e.g., TDD, FDD, flexible duplex)
 - Performance metric (e.g., spectrum efficiency, throughput, etc. for both gNB and UE)
 - Interference mitigation requirement for self-interference & CLI to guarantee significant performance gain
- **Study standardization impacts for full duplex operation**
 - Interference handling scheme (i.e., self-interference, inter/intra-cell UE-UE interference, gNB-gNB interference)
 - With known/unknown interference information
 - For DL/UL symbol boundary unaligned at gNB (e.g., due to inter-cell propagation delay) or UE (e.g., due to TA)
 - UE behavior (e.g., duplex mode adaptation, initial access, SSB configuration, etc.)