

The vivo logo is positioned in the top left corner of the slide. The background of the entire slide is a dark blue, abstract image with glowing, fiber-like structures radiating from a central point, resembling a microscopic view of biological tissue or a network diagram.

3GPP TSG RAN Rel-18 workshop

RWS-210175

Electronic Meeting, June 28 - July 2, 2021

Views on duplex evolution in Rel-18

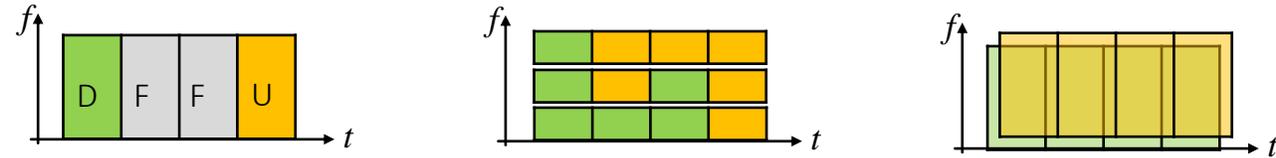
Source: vivo

Document for: Discussion & Decision

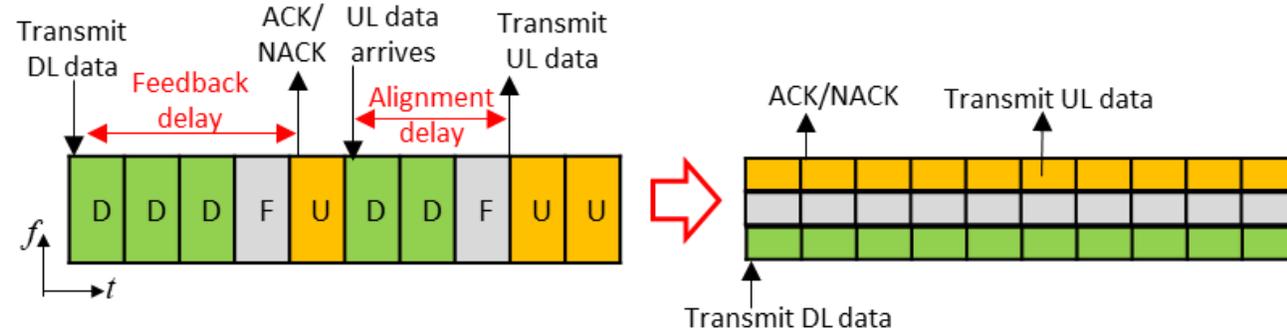
Agenda Item: 4.3

Benefits of advanced duplex schemes

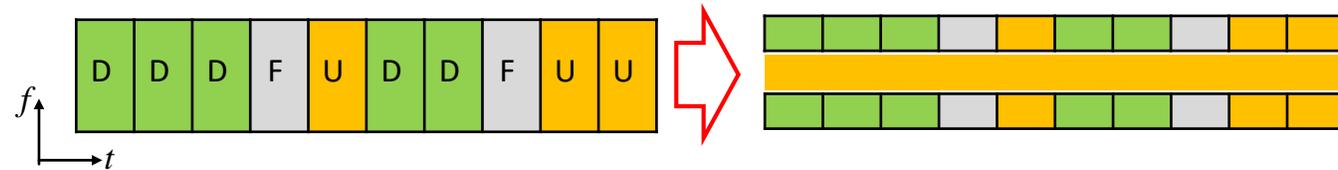
Increase spectrum usage flexibility



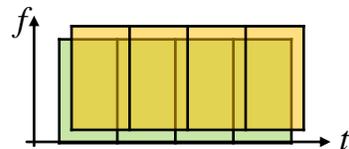
Reduce latency



Improve uplink coverage



Improve data rate & cell capacity



Evolution path of advanced duplex schemes

From dynamic TDD to full duplex

Type 0

Type 1

Type 2

Type 3

Type 4

NW: Dynamic TDD
UE: Dynamic TDD

NW: Quasi Full Duplex
UE: Half Duplex

NW: Full Duplex
UE: Half Duplex

NW: Full Duplex
UE: Quasi Full Duplex

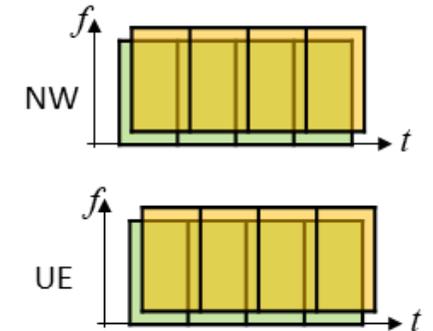
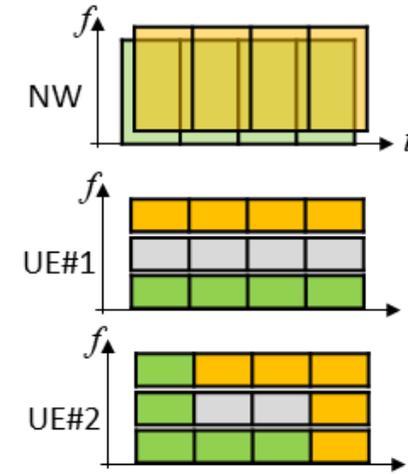
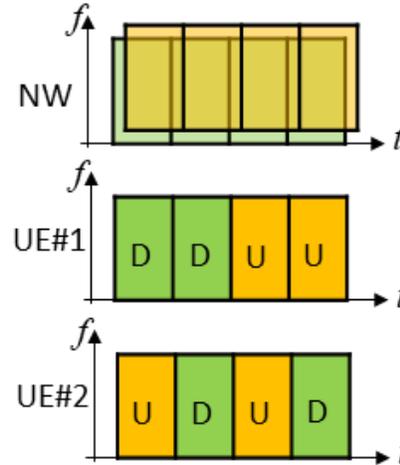
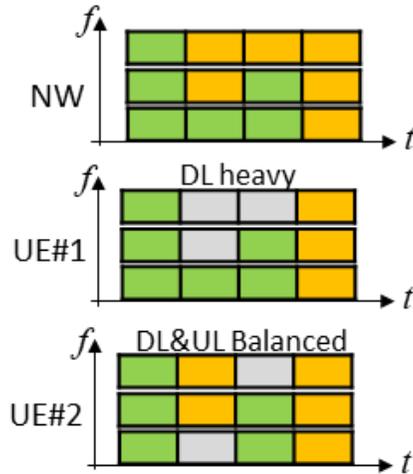
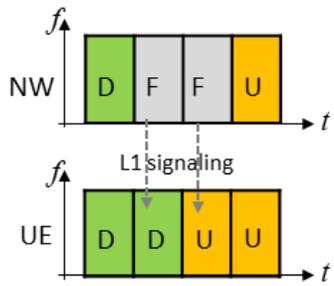
NW: Full Duplex
UE: Full Duplex

Rel-15/16/17

Rel-18

Rel-18 or later?

Future releases



We are here!

- Latency reduction (LR) from system perspective
- UL coverage

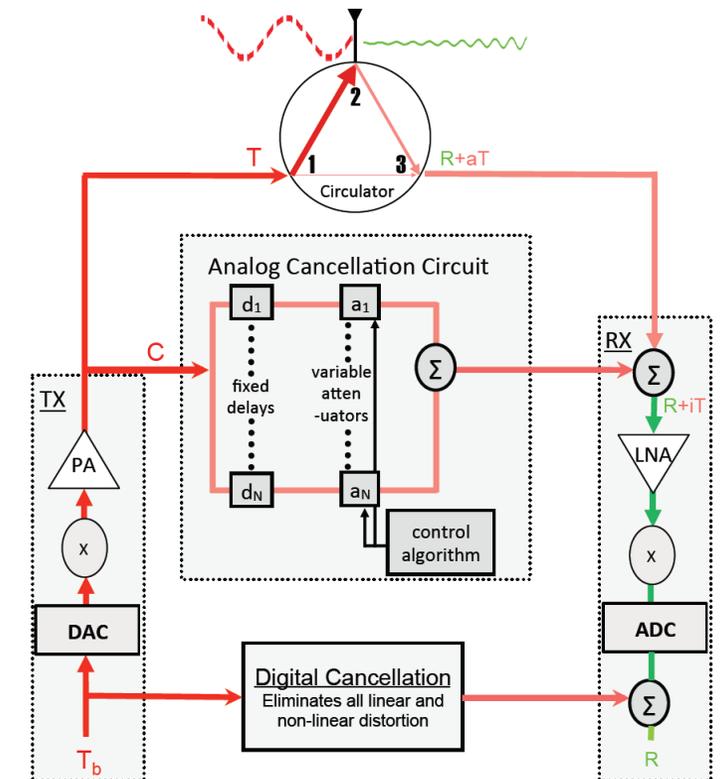
- LR from system perspective
- UL coverage
- Cell capacity

- LR from a single user perspective
- UL coverage (FFS)
- Cell capacity

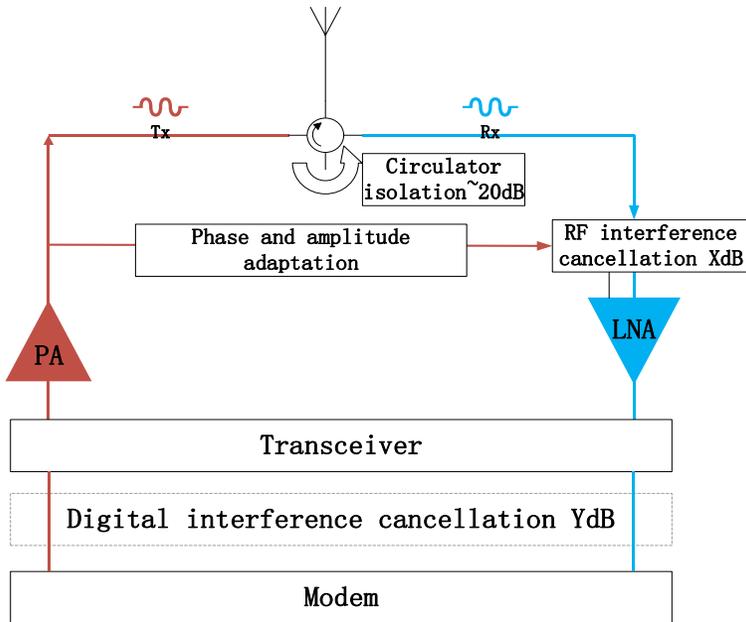
- LR from a single user perspective
- Cell capacity
- Better UPT

Challenges for the gNB self-interference cancellation

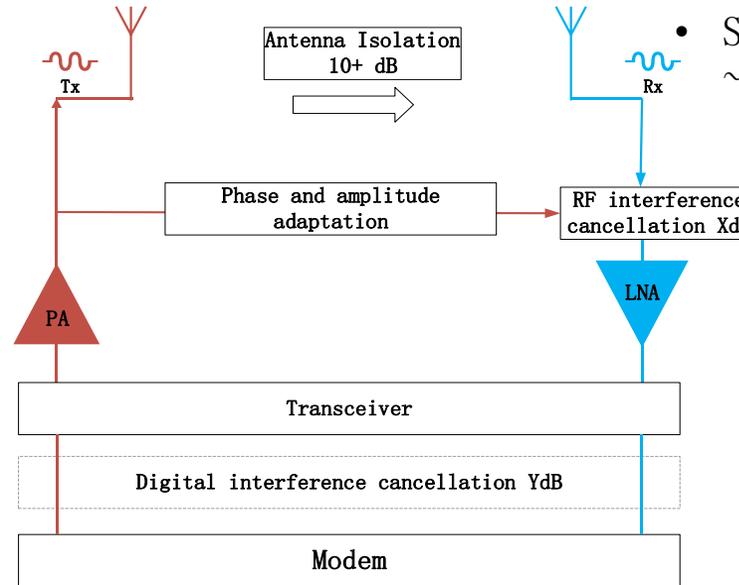
- Although the demo demonstration for gNB self-interference cancellation looks promising, some practical issues need careful study
 - Impact due to gNB discontinuous transmission
 - The dynamic variation of gNB transmission in time/frequency/power domain will cause trouble for the phase and amplitude tracing in RF cancellation
 - Near field reflections
 - Besides on board and direct interference, near field reflections also very strong part signal need to be canceled.
 - Inter-cell interference
 - Intercell interference from co-channel and adjacent channel, including far-away cells
 - Non-linear self-interference
 - Harmonics and inter intermodulation interferences sometimes can not be ignored and difficult to dealt with.



Challenges for the UE self-interference cancellation



Single antenna based solution



Multi-antenna based solution

• Self-interference cancellation target: $\sim 110\text{dB}$

- Antenna isolation: $10\sim 20\text{dB}$ for feasible smartphone implementation
- RF cancellation : $X\sim 20\text{dB}$
- Digital cancellation: $Y = \text{up to } 30\text{dB}$
- **>40 dB gap from the target**

• Space limitation:

- High antenna isolation impossible
- The size of traditional circulator is too large (\sim centimeter order), new magnetic-free circulator is still on the paper
- Insertion loss (circulator, RF interference cancellation path)
- Feasibility of fast adaptation of UE RF interference cancellation is unclear due to
 - DTX, Dynamic RB allocation, dynamic power control

➔ Do not consider any type of full duplex at the UE side in Rel-18 time frame

Potential study of NW full duplex in Rel-18

- Duplex Schemes

- Type 1: Quasi Full Duplex @NW + Half Duplex @ UE
- Type 2: Full Duplex @NW + Half Duplex @ UE
 - Including the possibility of full duplex operation for some L1 signal/channels, e.g PUCCH for SR/HARQ-ACK, but not for PUSCH

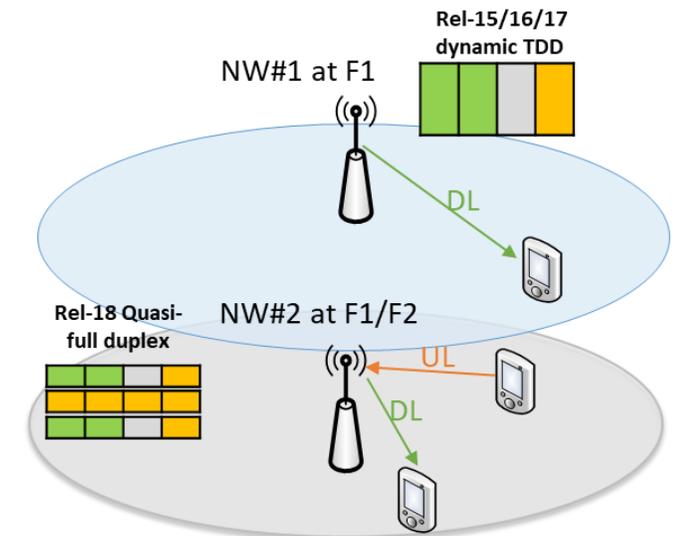
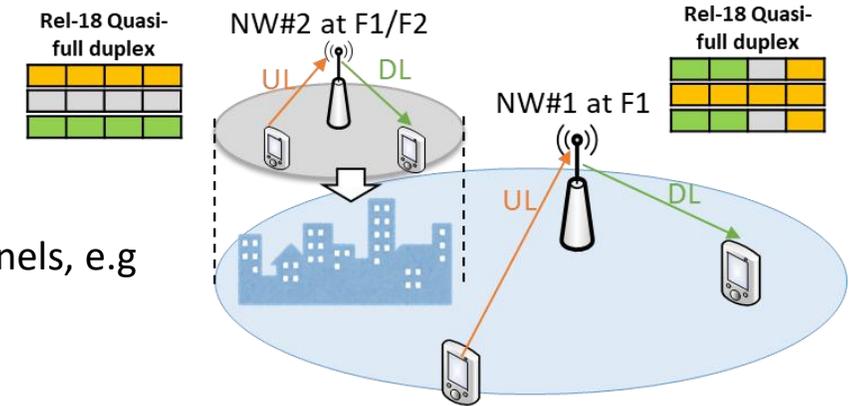
- Deployment scenarios potential co-existence issues

- Urban vs Urban; Urban vs indoor; Indoor vs indoor
- Intra-operator and inter-operator
- Co-channel and adjacent channel
- FR1 and FR2

- Self-interference cancellation at BS side only

- CLI interference handling for both co-channel and adjacent channel

- No impact to the UE RF requirement



THANK YOU.

谢谢。