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

RWS-210136

KDDI's view on Rel-18

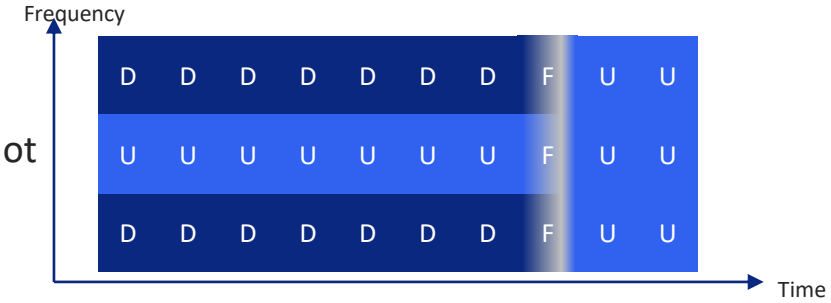
KDDI corporation

Prioritized Rel-18 items (from our perspective)

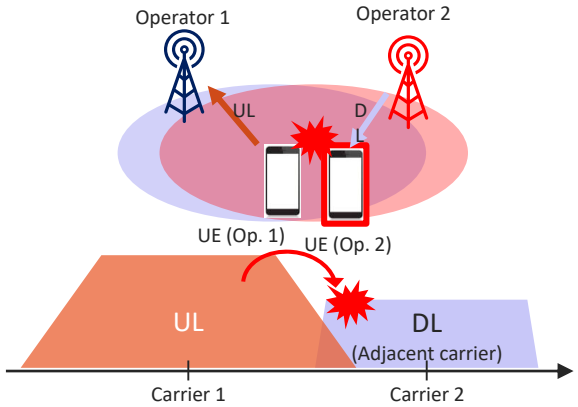
- eMBB-driven functional evolution
  - Flexible duplex (RAN1/2/3/4) RWS-210286
  - NR repeaters and Reconfigurable Intelligent Surface (RAN1/4) RWS-210300
  - Conditional Handover enhancement (RAN2/3) RWS-210137
- Non-eMBB-driven functional evolution
  - RAN slicing enhancement (RAN2) RWS-210139
  - Reference TimeInfo enhancement in EN-DC (RAN2) RWS-210138
- Cross-functionalities, new areas
  - Inter gNB coordination (RAN3) RWS-210140

Flexible duplex (RAN1/2/3/4)

- Motivation
  - Increase the UL resources for TDD config2 to reduce latency caused by the time spent waiting for the UL slot
- Objectives
  - Physical layer enhancement for multiple TDD configurations within the single carrier (RAN1)
  - Solution for intra operator Interference (RAN1/3)
    - Inter-gNB cross-link interference
    - Inter-UE cross-link interference(both Intra-gNB and Inter gNB)
  - Solution for inter operator Interference (RAN4)
    - Guard band to avoid the possible interference to adjacent channels cased by additional UL resources
  - Ensure the backward compatibility so that the gNB introducing this feature can still accommodate legacy before Rel-17 UEs (RAN1/2)



Physical layer enhancement



Solution for inter operator Interference (Guard band)

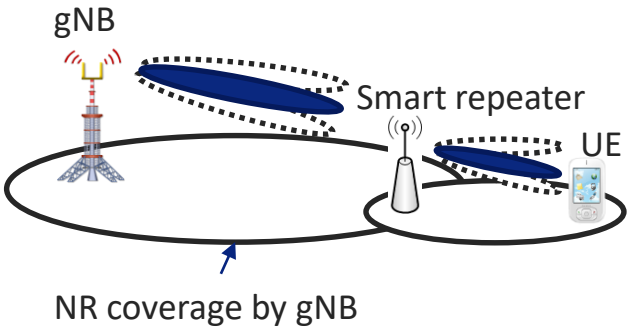
Repeater / Reconfigurable Intelligent Surface (RAN1/4)

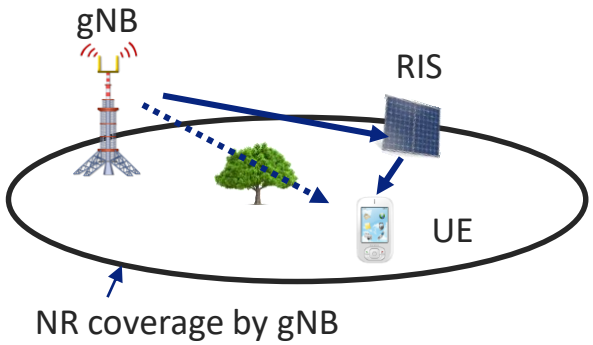
- Motivation
  - Although many operators have already started to deploy NR in FR2, the propagation loss and blockages in FR2 make it difficult to spread the area coverage, and even within the area, there are many dead spots.
  - We understand that the IAB is positioned as a highly functional relay node and can expand coverage while securing system capacity by controlling resources. However, as an operator, it would be desirable to have a simpler way to expand coverage and prevent dead spots.

- Candidate Solutions
  - Repeater, which can control its analog beam in cooperation with gNB. In other words, a smart repeater.
  - Reflective intelligent surface (RIS), which can control the direction of radio wave refraction in cooperation with gNB.

Repeater / Reconfigurable Intelligent Surface (RAN1/4)

- Expected effects when these features are introduced
  - <u>Smart repeater</u>
    - Coverage expansion in outdoor
    - Improvement of O2I penetration
  - <u>Reflective intelligent surface</u>
    - Measures against dead sports in gNB coverage
    - Improvement of the number of MIMO layers

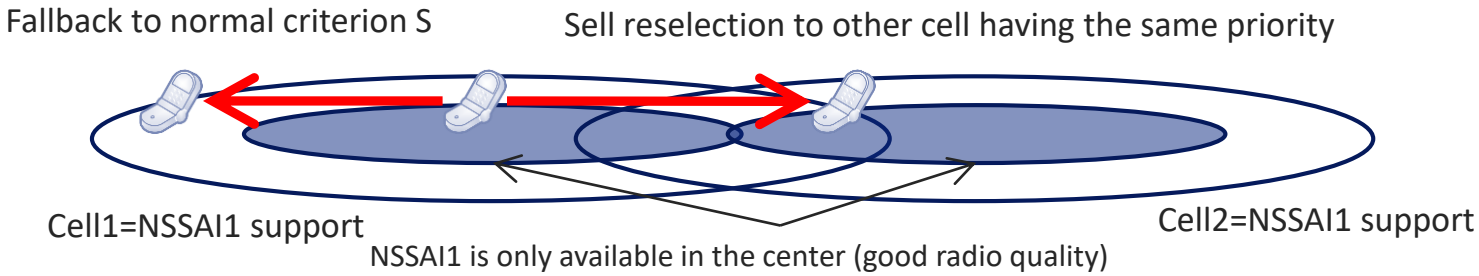




- Expected works
  - Evaluation and verification of effects
  - Discussion on how to achieve beam control and reflection direction control
  - Identification of possible enhancements.

RAN slicing Enhancement (RAN2)

- Motivation
  - Premium services require better radio quality than usual (i.e. services using 256QAM/1024QAM)
  - Fallback mechanism to switch back to another slice having next service level
  - Solutions are expected for both “connected” and “idle”
- Objectives
  - Leftovers from Rel-17
    - Slice remapping, which was not standardized in Rel-17
    - TA(Tracking area) aware cell reselection, if there is left overs from Rel-17
  - Slice dedicated cell selection criterion S
    - Introduce a new service dedicated “criterion S” which contributes better SLA assurance



Reference TimeInfo enhancement in EN-DC (RAN2)

- Motivation
  - NR “ReferenceTimeInfo” has higher accuracy than LTE’s one, but NR “ReferenceTimeInfo” is not accessible to UEs in EN-DC operation
    - LTE refQuarterMicroSeconds-r15 INTEGER (0..3999)
    - NR refTenNanoSeconds-r16 INTEGER (0..99999)
  - UE in EN-DC cannot access higher accurate reference time even in the case where NR is available
  - So, it is beneficial to develop a solution for those UEs in EN-DC to access NR “ReferenceTimeInfo”

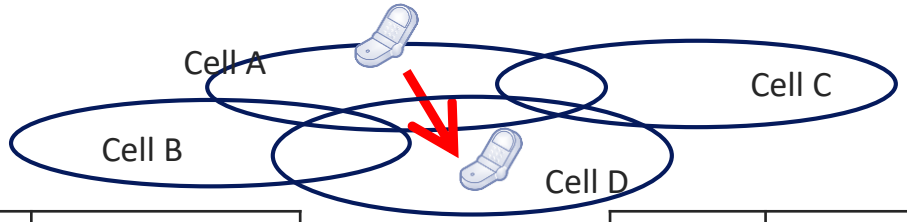
	RRC_IDLE : accuracy	RRC_CONNECTED : accuracy
LTE	LTE SIB16 : 250nano(1/4micro)	LTE DLInformationTransfer : 250nano(1/4micro)
NR	NR SIB9: 10nano	LTE DLInformationTransfer : 10nano
EN-DC	LTE SIB16 : 250nano(1/4micro)	LTE DLInformationTransfer : 250nano(1/4micro)

- Candidate solutions
  - For CONNECTED, one candidate solution is to use NR DLInformationTransfer on SRB3
  - For IDLE, one candidate solution is NR SIB9 receiving while the UE still camps on the LTE cell
  - Delay compensation technique which is applicable to EN-DC operation can be explorer if needed

Conditional Handover enhancement (RAN2)

- Motivation
  - CHO should be configured again, when the UE moves to other cells. In other words, if the CHO configurations can be used even after the handover, it can reduce the signaling overhead caused by 2nd reconfiguration.
- Objectives
  - Develop a mechanism which realizes CHO configurations which can be used even after the handover
  - Multiple base stations share the conditional handover configurations which are uniformly valid under those base stations, regardless of which base stations the UE connects to
  - Admission control should be studied to avoid reserving too much resources for potential handovers

Rel-16/17 CHO : CHO configurations for Cell C and Cell B is removed when the UE moves to Cell D



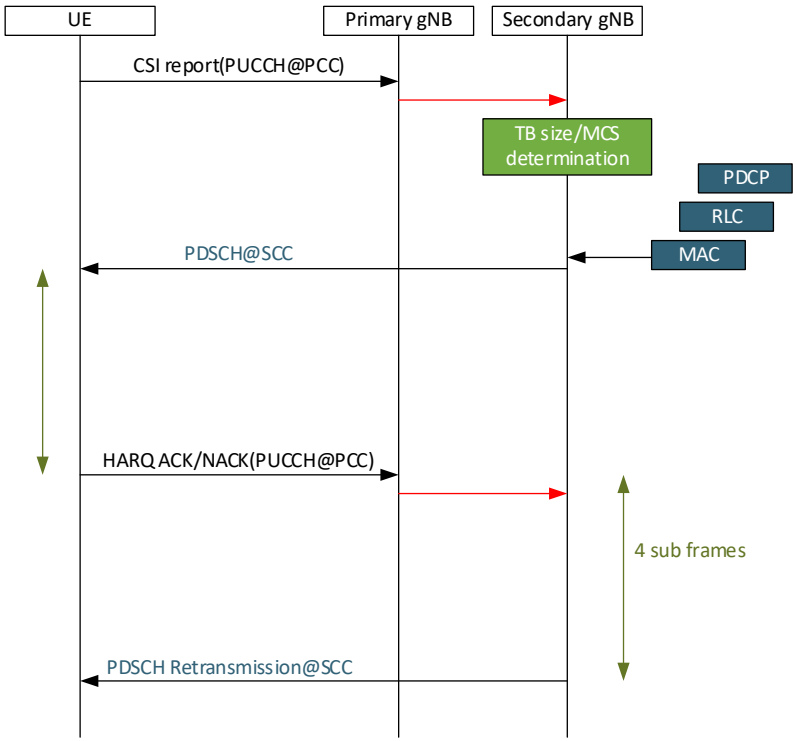
Rel-18 CHO improvement: UE maintains the CHO configurations after the handover

~~Cell B~~	~~ExecutionCond B~~	~~RRCReconfig B~~
~~Cell C~~	~~ExecutionCond C~~	~~RRCReconfig C~~
~~Cell D~~	~~ExecutionCond D~~	~~RRCReconfig D~~

Cell B	ExecutionCond B	RRCReconfig B
Cell C	ExecutionCond C	RRCReconfig C
Cell D	ExecutionCond D	RRCReconfig D

Inter gNB coordination (RAN3)

- Motivation
  - Study the feasibility of the coordination mechanism/interface among multiple gNBs
- Use cases
  - Carrier Aggregation and/or Triple connectivity
  - Multi TRP
  - Multiple Central Units for Resiliency/Traffic offload/dedicated central unit (like “DÉCOR”)
- Objectives
  - Architecture and models
  - Time Synchronization mechanism among relevant network nodes
  - Configuration/information sharing mechanism among relevant network nodes
  - Both C-plane and U-plane coordination mechanism



Tomorrow, Together

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