3GPP TSG RAN Meeting #102
Edinburgh, Scotland, Dec 11-15, 2023

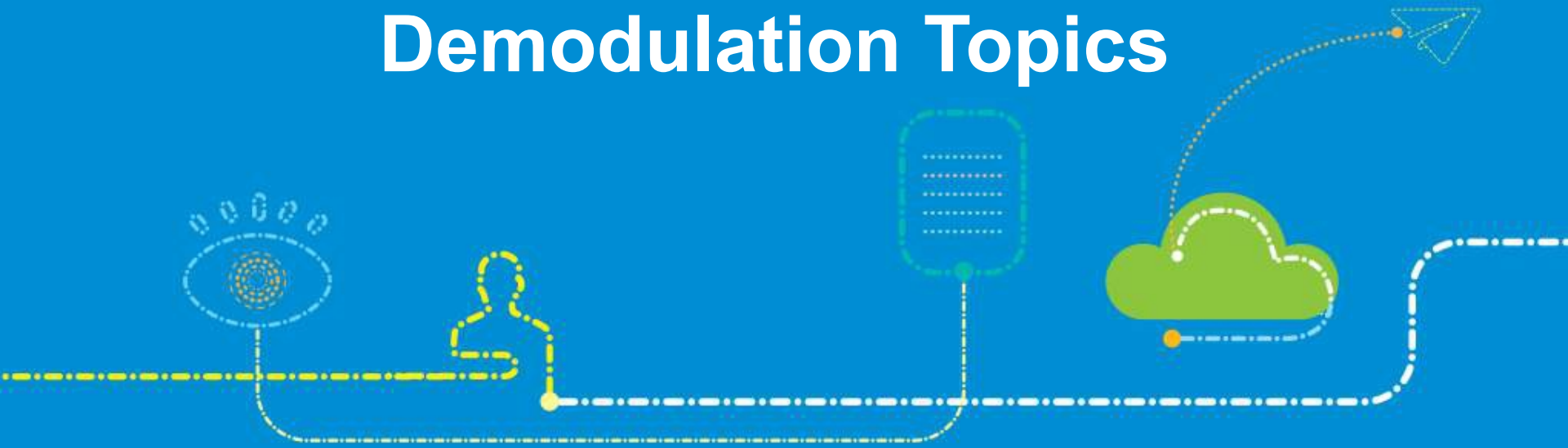
RP-233627

ZTE
Tomorrow never waits

Source: ZTE, Sanechips

Agenda: 9.1.4.3

Views on Rel-19 RRM and Demodulation Topics



UE RRM related evolution in Rel-19

- Justification:
  - For R18 FR2 UE, the existing requirements for RLM and BFD is highly related with Rx beam numbers and T_{DRX}. Especially when DRX is larger than 320ms with 8 Rx beams, side condition might have already changed due to UE mobility or UE rotation related behavior. It is necessary to shorten the evaluation period for long DRX cycles.
    - Apply non-DRX mode when large DRX cycle is configured
    - Reduce Rx beam numbers
- **Proposal**: to reduce RLM and BFD evaluation period for FR2 UE by reducing Rx beam numbers or apply non-DRX mode when large DRX cycle is configured.

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UE RRM related evolution in Rel-19

- Justification:
  - In Rel-18, multi-panel to enhance the MIMO layer and L1 measurement was supported. In fact, the RRM measurement could be further improved for UE capable of simultaneous multi-panel reception, such as
    - Reduce Rx beam numbers
    - Further study group-based reporting mechanism
    - L3 measurement enhancement
- **Proposal**: RRM measurement enhancement is expected by applying simultaneous multi-panel reception.

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UE RRM related evolution in Rel-19

- Justification:
  - The SCell activation further enhancement in Rel-19 due to TU budget concerns, multiple issues were not resolved in R18.
  - Candidate techniques to be considered for the further enhancements for both FR1 and FR2.
    - QCL information related enhancement
    - Update for ending point of SCell activation
    - TCI indication related enhancement
- **Proposal**: Further enhancement on the SCell activation, focus on the potential enhancements deprioritized in Rel-18, including QCL information related enhancement, ending point of SCell activation, TCI indication related enhancement, not restrict to FR2, both FR1 and FR2 could be applicable.

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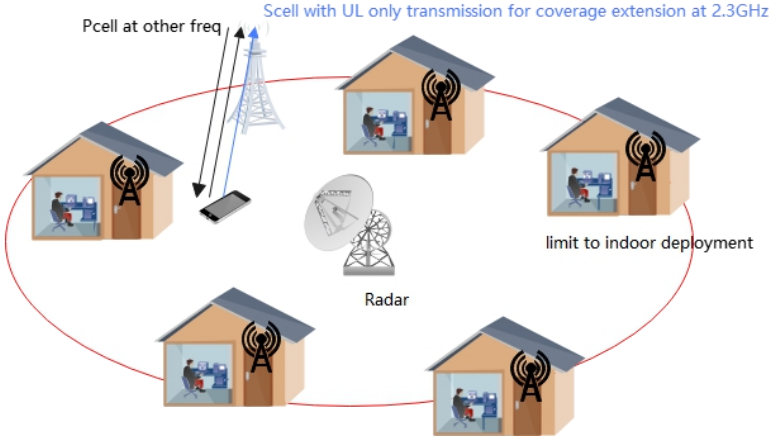
UE RRM related evolution in Rel-19

- Justification:
  - In certain regions, the deployment at 2.3GHz now is restricted to the indoor scenario due to the protection of the incumbent service.
  - In order to better utilize the spectrum of 2.3GHz at the outdoor scenario, **Scell with UL only transmission would provide good coexistence performance with the incumbent service due to its limited transmission power and carrier emissions from UE transmitter.**



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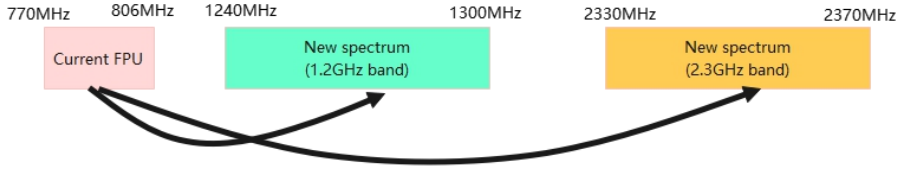
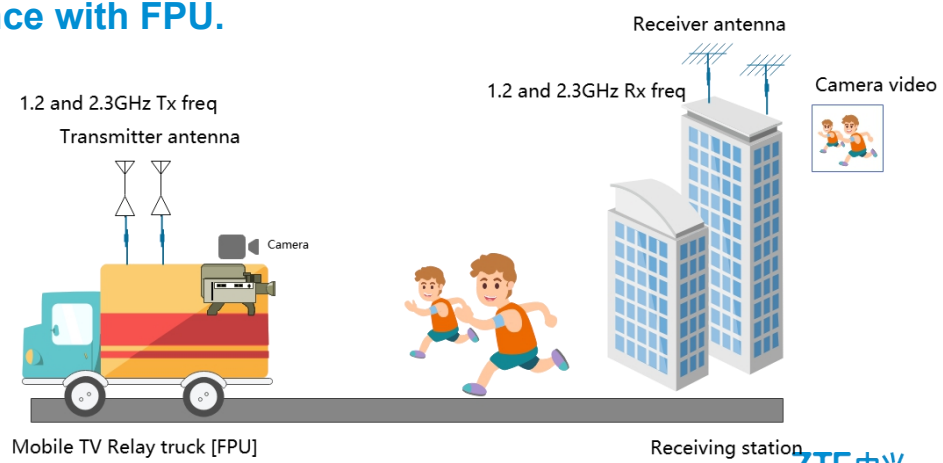
UE RRM related evolution in Rel-19

Justification:

- In Japan, MIC has decided to allocate the 700MHz band to IMT service and the 1.2GHz and 2.3GHz bands to FPU service.
- Japan was planning to start assigning frequencies in the 2.3 GHz band by the end of 2023 and triple allocations across all compatible spectrum bands in 2025.
- It's essential to protect the incumbent service FPU from the foreseen IMT deployment, otherwise IMT BS DL CLI towards to FPU receiver would be significant.
- **Scell with UL only transmission at 2.3GHz could mitigate the gNB to gNB CLI issue to enable the good coexistence performance with FPU.**





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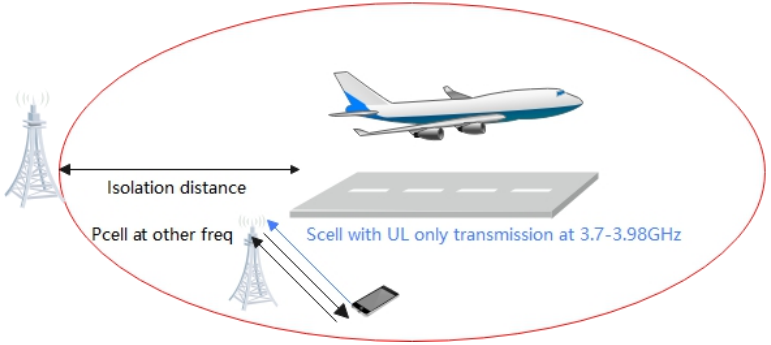
UE RRM related evolution in Rel-19

- Justification:
  - In USA, there are long discussion on coexistence issue between IMT deployment at C-band and aircraft radio altimeter at 4.2-4.4GHz.
  - The FAA determined that radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the 3.7-3.98 GHz frequency band (5G C-Band).
  - **Scell with UL only transmission at 5G C-band could provide good solution to enable the good coexistence performance with aircraft radio altimeter if there are no additional filtering implemented for the protection of interference from IMT network at the aircraft.**



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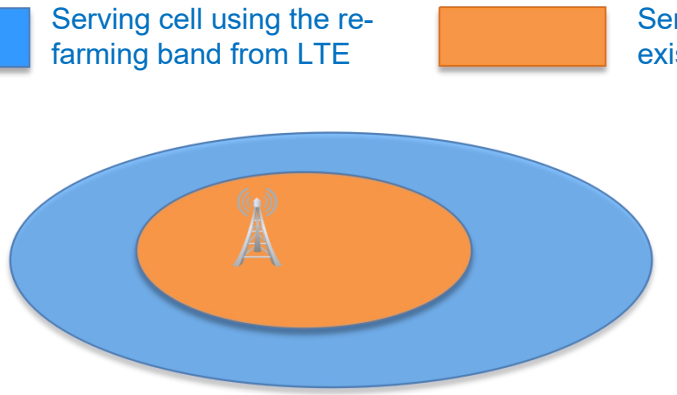
UE RRM related evolution in Rel-19

- Justification:
  - With the deployment of NR network, operators may refarm some of the LTE bands to NR to improve UL coverage and throughput.
  - Re-farm bands for UL transmission might be possible given NR coverage is UL limited. An operator may use other higher NR bands for capacity and the re-farming LTE band for coverage.
  - **Scell with UL only transmission can address such re-farming demands from operators.**



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UE RRM related evolution in Rel-19

- Justification:
  - Based on the study in Rel-18, UL only scell by shutting down the NW DL transmitter could achieve significant power saving. For BS Category 1, 65.5% to 71.7% of network power saving gain could be achieved and for BS Category 2, 80.7% to 83.3% of power saving gain could be achieved.
  - **Scell with UL only transmission could provide further network energy saving enhancement.**

Power state	BS Category 1			BS Category 2		
	Set 1	Set 2	Set 3	Set 1	Set 2	Set 3
Deep sleep	1			1		
Light sleep	25			2.1		
Micro sleep	55	50	38	5.5	5	3
Active DL	280	200	152	32	26	17.6
Active UL	110	90	80	6.5	5.8	4.2

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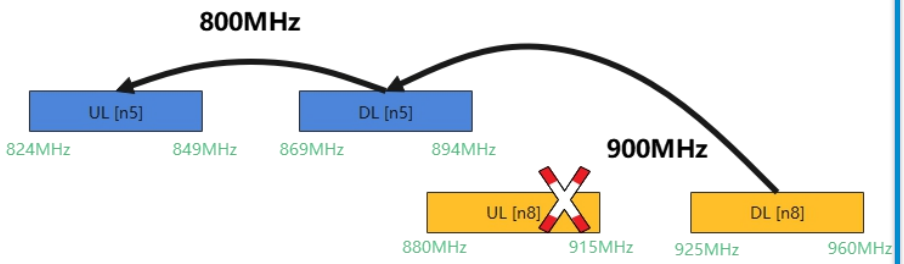
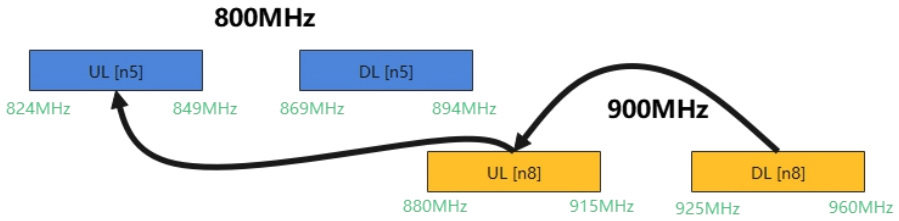
UE RRM related evolution in Rel-19

- Justification:
  - In Rel-18, for the band combination of CA_n5-n8, options 2 & 3 are dropped and only option 1 will be considered.
    - ✓ Option 1: DL CA_n5-n8 with single UL in n5 only
    - ✓ Option 2: UL/DL CA_n5-n8 with non-simultaneous Rx/Tx between n5 DL and n8 UL
    - ✓ Option 3: UL/DL CA_n5-n8 with additional dedicated filter for the restricted frequency ranges for specific operator
- **Scell with UL only transmission could enable the operators to utilize the uplink spectrum in band n8 in addition to Rel-18 Option 1 solution.**



Rel-18 solution for CA_n5-n8



Rel-19 complementary solution for CA_n5-n8

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UE RRM related evolution in Rel-19

- To consider the Scell with UL only transmission in Rel-19 RAN4 RRM WID:
  - ✓ Objective:
    - To define the RRM requirement for Scell with UL only transmission [RAN4].
    - Potential RAN1/2 impact if any could be triggered by LS.

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UE Demod related evolution in Rel-19

- **Justification**:
  - In Rel-17, the evaluation scenarios of CRS-IM mainly focus on antenna configuration 4x2 or 4x4 which is basically targeted for normal UE.
  - For Redcap UE introduced in Rel-17, its receiver numbers are reduced to 1Rx and 2Rx to reduce the cost.
  - In Rel-15, RAN4 defined the performance requirement of CRS-IM for LTE Single RX Chain UEs.
- **Proposal**: to define CRS-IM Performance Requirements for Redcap UE with single receiver in Rel-19 to ensure that Redcap UE could have the same capability to handle LTE CRS interference similar as normal NR UE.

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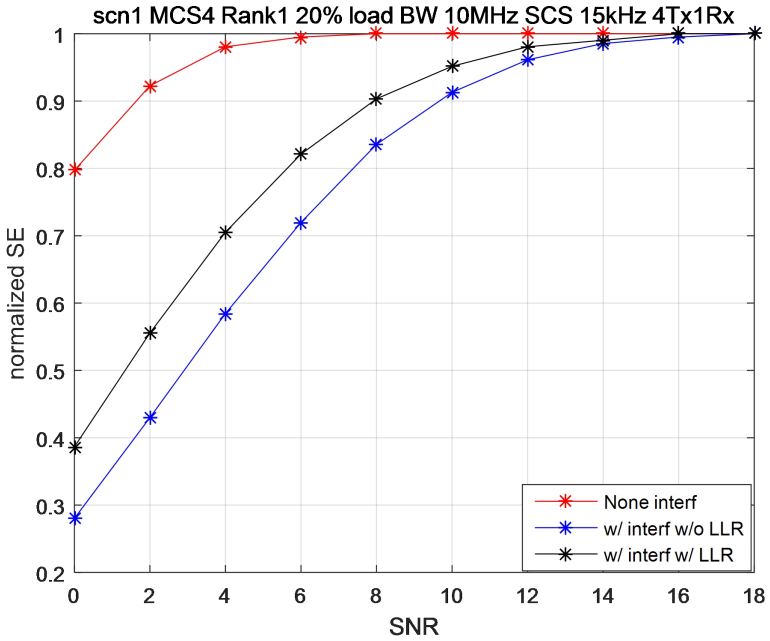
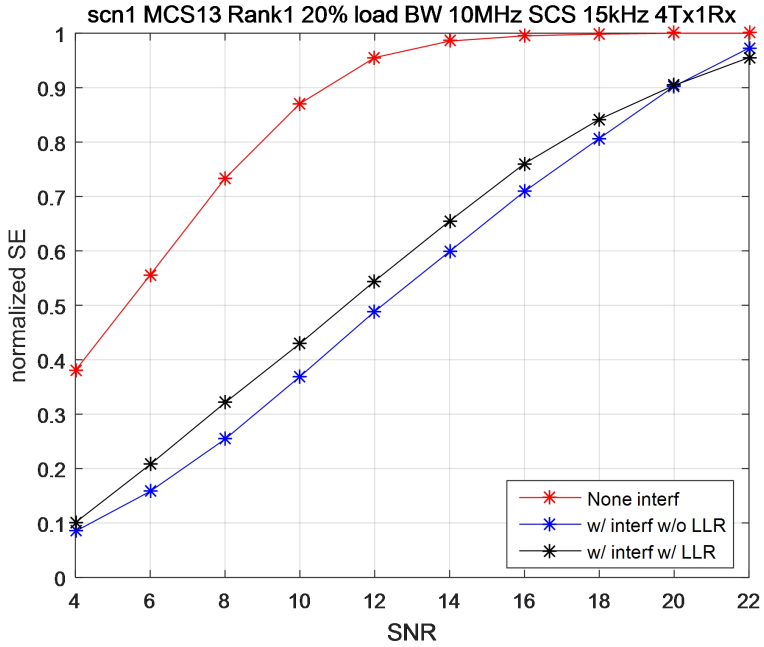
Simulation results-Scenario 1





» Required SNR (dB) at 70% max TP

Reference (No CRS-IM)	CRS-IM LLR weighting
5.7dB	3.9dB

» Required SNR (dB) at 70% max TP

Reference (No CRS-IM)	CRS-IM LLR weighting
15.8dB	14.8dB

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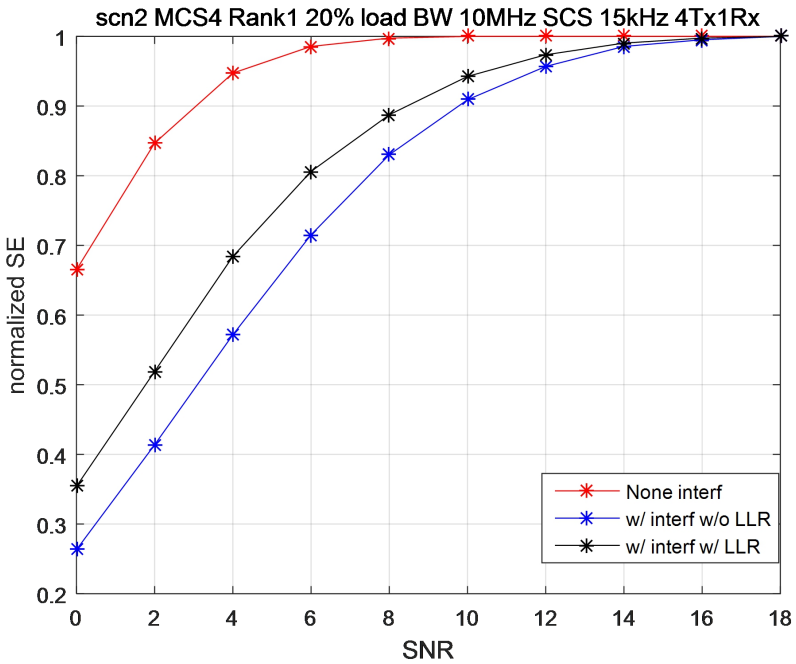
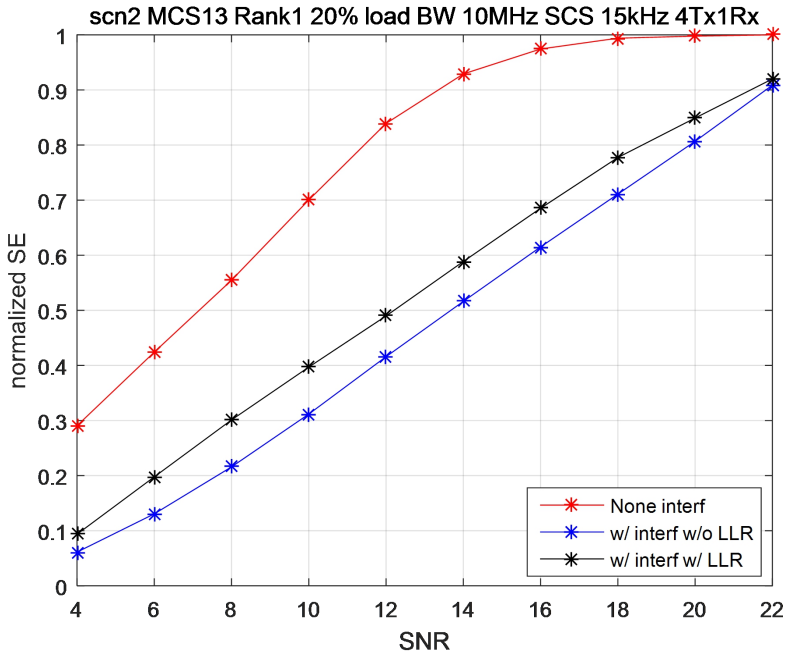
Simulation results-Scenario 2





» Required SNR (dB) at 70% max TP

Reference (No CRS-IM)	CRS-IM LLR weighting
5.7dB	4.3dB

» Required SNR (dB) at 70% max TP

Reference (No CRS-IM)	CRS-IM LLR weighting
17.8dB	16.3dB

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UE Demod related evolution in Rel-19

- **Justification**:
  - In Rel-18, only 4T8R with 4 MIMO layers and 8T8R with 8 MIMO layers are specified.
  - However in the practical netowork, 8 MIMO layers for 8Rx FWA is somehow difficult to be achieved in general.
  - In order to make the RAN4 requirement more aligned with the practical network channel condition, other MIMO layers should be also considered for 8Rx FWA.
- **Proposal**: to specify demod requirement for 8T8R with 5,6,7 MIMO layers.

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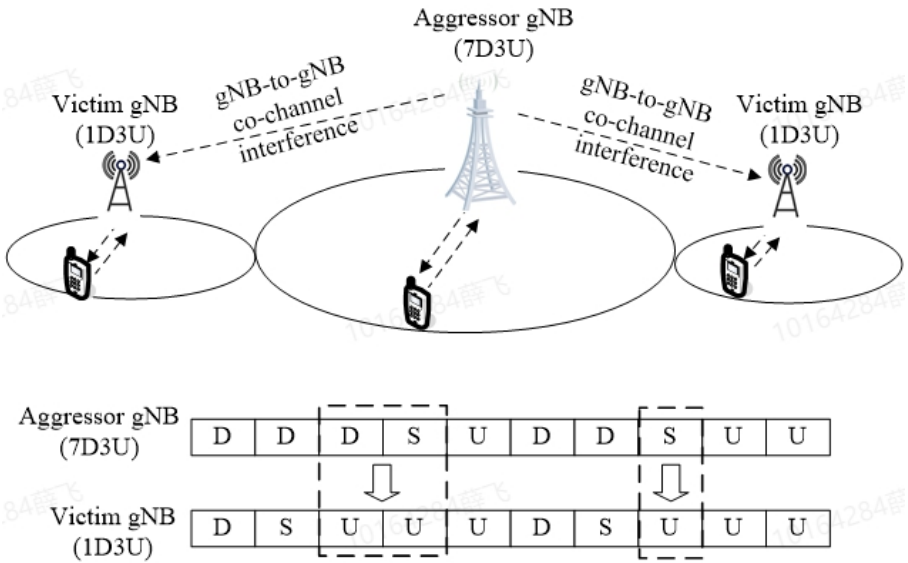
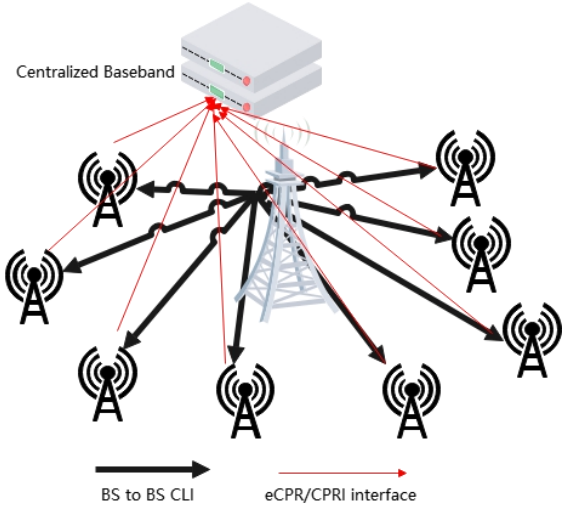
BS Demod related evolution in Rel-19

- **Justifcation:**
  - If to configure different TDD pattern in HetNet scenario, there will be some CLI probems from WA gNB to LA gNB.
- **Proposal:** to investigate some advanced receiver (e.g. MMSE-IRC etc) to handle the BS CLI problems in dynamic TDD scenario.





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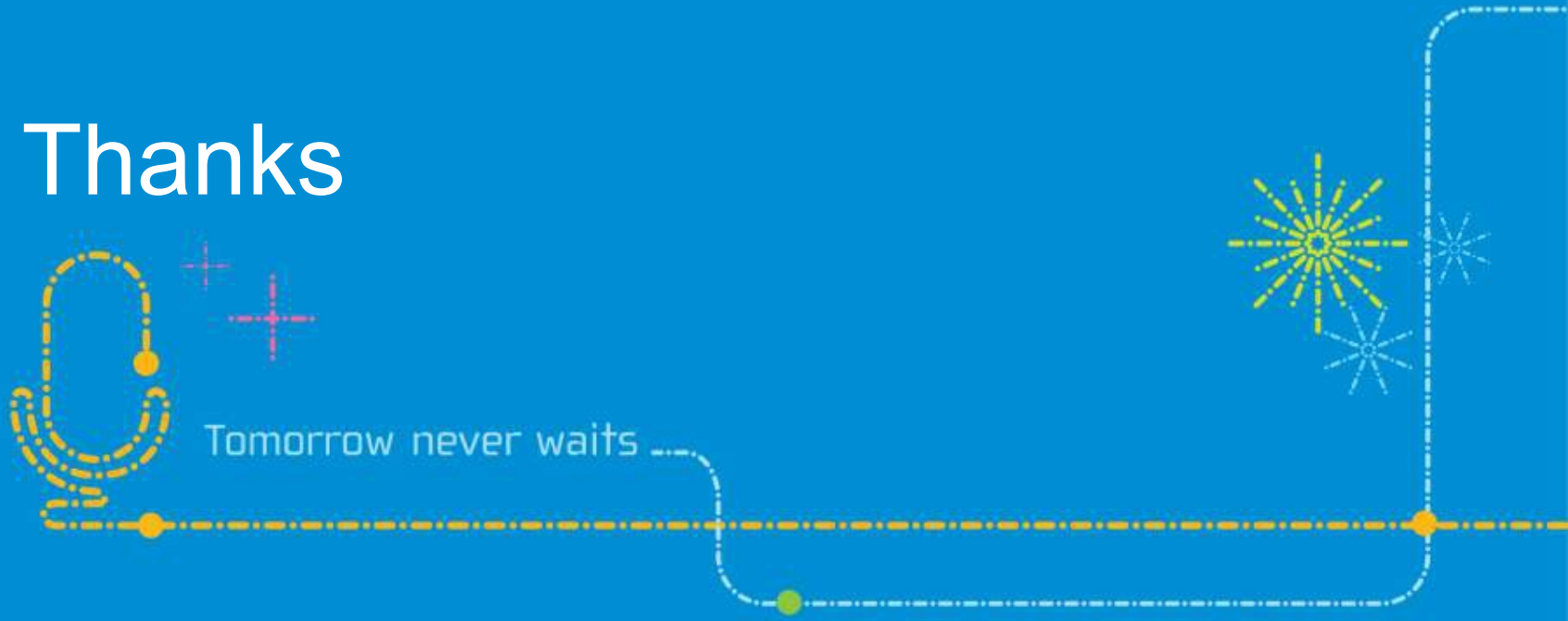
Thanks