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

RWS-210163

AI: 4.1

Enhancement on IRC receiver performance

Background

- MMSE-IRC receiver with DMRS based interference covariance estimation(ICE) is already adopted, however, PDSCH/PUSCH allocation in NR is very flexible resulting in interference covariance on some OFDM symbols varies and ICE based on DMRS is not compatible.
  - Time domain resource allocation (TDRA) is flexible, Type A and Type B
    - Inter-cell interference may vary in time due to different TDRA
  - DMRS configuration is flexible, type 1/type 2, single/double symbol, number of additional DMRS.
    - Type 1: Comb structure, odd/even sub-carriers, up to 8 ports,
    - Type 2: Frequency domain CDD over 2 adjacent sub-carriers, up to 12 ports
    - DMRS symbol position may or may not overlap among neighboring cells
    - Interference measurement on DMRS may not reflect actual interference

DMRS port allocation for rank=1

Value	Number of DMRS CDM group(s) without data	DMRS port(s)
0	1	0
1	1	1
2	2	0
3	2	1
4	2	2
5	2	3
6-7	Reserved	Reserved

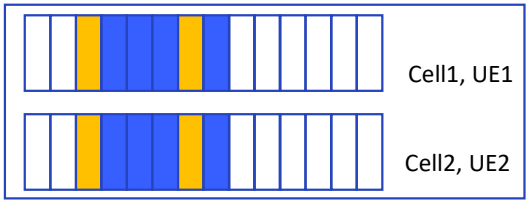
DMRS port allocation for rank=2

Value	Number of DMRS CDM group(s) without data	DMRS port(s)
0	1	0,1
1	2	0,1
2	2	2,3
3	2	0,2
4-7	Reserved	Reserved

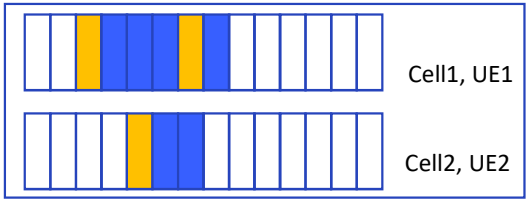
IRC receiver performance – 1/2

PUSCH performance

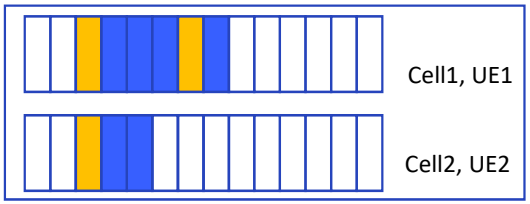
- Case1: 6 symbols for UE1 and UE2, fully overlapped



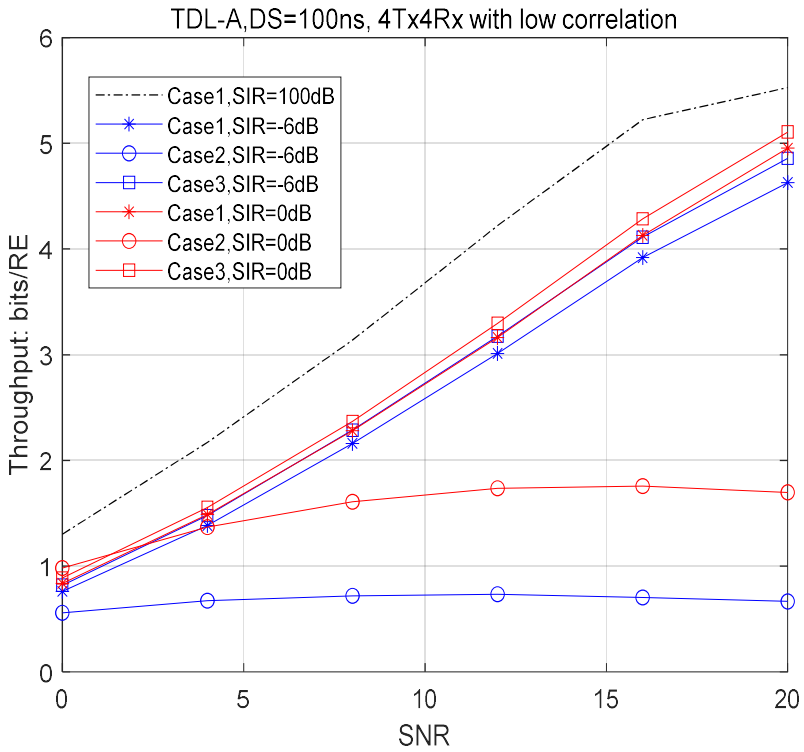
- Case2: : 6 symbols for UE1, 3 symbols for UE2, overlapped with 3 symbols of UE1 with non-aligned DMRS symbol



- Case3: 6 symbols for UE1, 3 symbols for UE2, overlapped with first 3 symbols of UE1 with aligned DMRS symbol



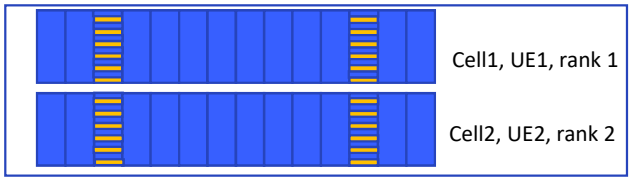
Data RE
DMRS RE
Blank RE



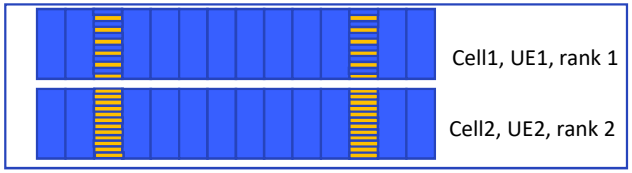
IRC receiver performance -2/2

PDSCH performance

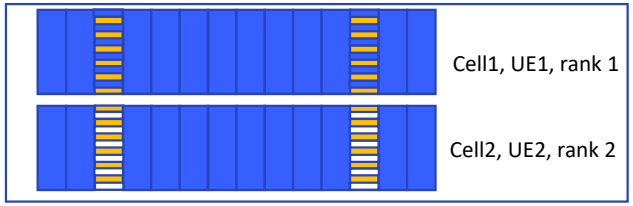
- Case1: slot based, fully overlapped, scheduled DMRS in neighboring cell (same CDM group, rank2) -- full



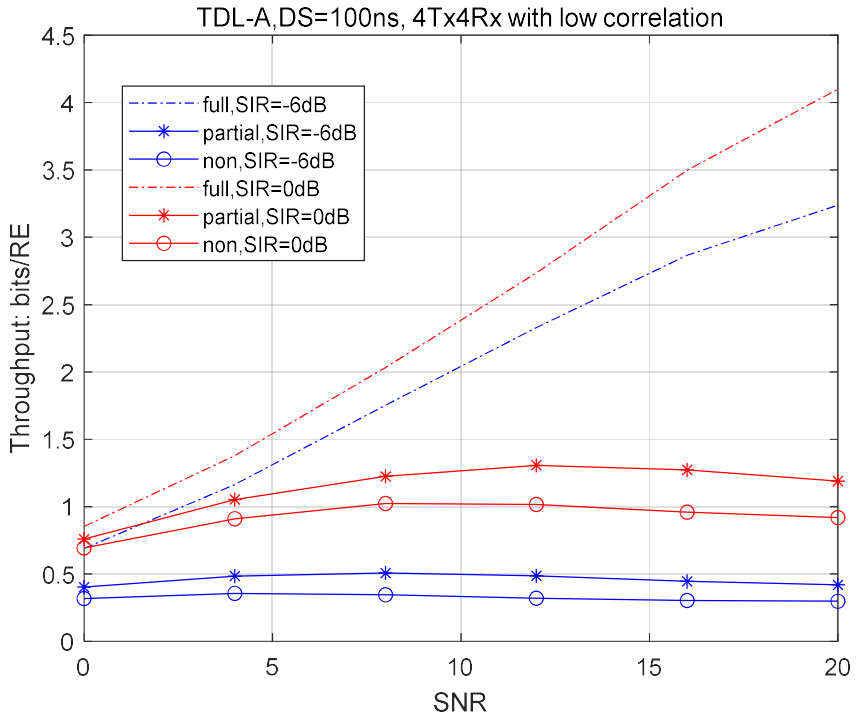
- Case2: slot based, fully overlapped, DMRS in serving cell “CDM group without data =1”; DMRS in neighboring cell “CDM group without data =2”, one port on each CDM group, rank 2 – partial



- Case3: slot based, fully overlapped, DMRS in serving cell “CDM group without data =1”; DMRS in neighboring cell “CDM group without data =2”, both ports on one CDM group, rank 2 – non



Data RE
DMRS RE
Blank RE



Enhancement of IRC receiver performance

Motivation and potential enhancement

- Motivations
  - Rel-17 RAN4 WI is limited on demodulation performance considering slot based operation and overlapping DMRS symbols
  - Interference due to with slot based and non-slot based multi-user scheduling
  - Interference due to uncoordinated neighboring cell scheduling
  - Interference in UL due to new scenarios such as flexible duplex, full duplex operations at gNB
- Potential enhancement
  - RAN1 based enhancement of IRC receiver performance including signaling and RS design, e.g. blank REs

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THANK YOU.
谢谢。