

R1-092560: Uplink CoMP link level
performance evaluation
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NOKIA

Content

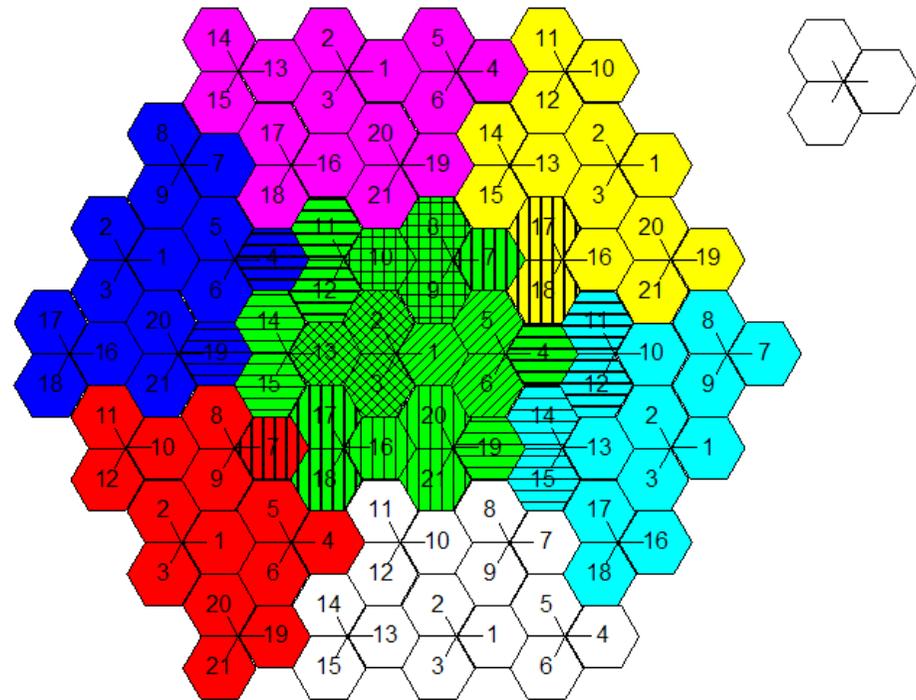
- In this contribution we present UL FDD CoMP performance compared to Rel'8 reference case
- Motivation is to introduce CoMP performance with realistic assumptions regarding to channel estimation and cross-correlation of RS sequences
- Simulation results include:
 - Reference results with MMSE receiver
 - CoMP results with turbo SIC
 - One site and three site CoMP (three cells/sectors in both cases)

Simulation assumptions

Parameter	Assumption
Cellular layout	Wraparound hexagonal grid, 7 cell sites, 3 sector per site
Inter-site distance	500 m
Minimum distance between UE and cell	35m
Carrier Frequency (CF)	2 GHz
Bandwidth (BW)	10 MHz
PUCCH BW	2 PRBs
Sub-band size	6 PRBs
Radio Channel	SCM-C
Lognormal Shadowing	Similar to UMTS 30.03
BS antenna height and antenna pattern	15m above rooftop, 2D with 70 degree 3dB angle, no antenna tilting (0 degree)
Number of antenna elements	1TX (UE) / 2 RX (BS)
UE power class	24dBm (250mW)
BS noise figure	5 dB
UE noise figure	9 dB
Thermal noise	-174 dBm/Hz
Inter/intra-cell Interference modelling	link level
UE distribution within cell	dropped uniformly in entire cell (equally number of users in each sector)
UE mobility	Fixed and identical speed $ v $ of 3km/h for all UEs with randomly and uniformly distributed direction
Receiver	Real channel estimation with MMSE/reference and turbo-SIC/CoMP
HARQ scheme	CC/IR with 8 sub-channels and maximum 4 transmissions
Power control	Closed loop PC with P_o : -82,-80 Alfa: 0.8
# UEs per cell	10
TD-FD scheduler	RR-PF (throughput based, non-channel dependent)

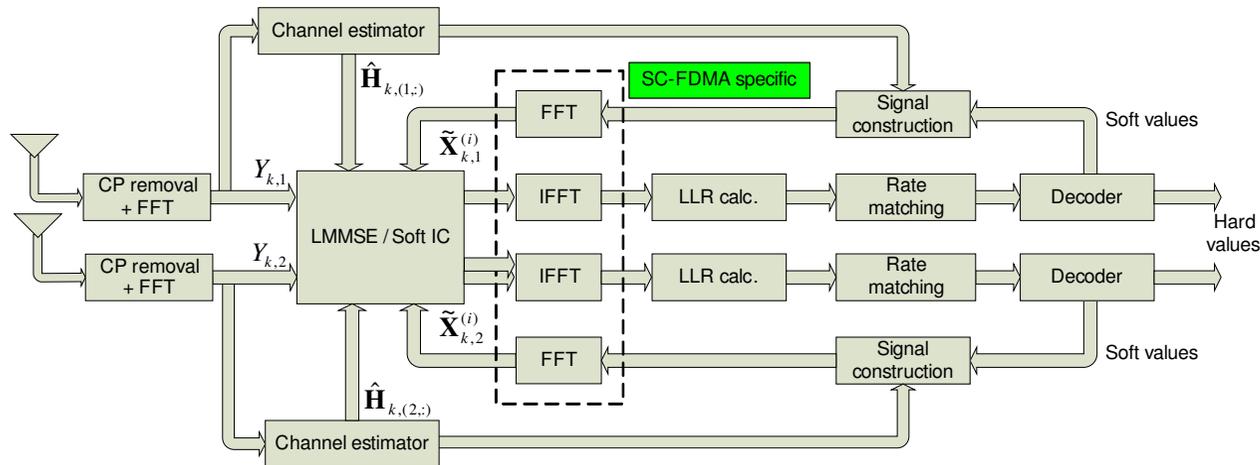
Network layout

- Figure in right hand side shows CoMP cells being joined with e.g. optical fibre
- Number of cells within CoMP is always three
- For example cells with ID number 1, 5 and 6 form three site CoMP case
- In case of one site CoMP there is no data transmission needed between sites (e.g. cells with ID number 1,2 and 3 form one site CoMP area).
- Different colours represents wrap-around location of same cells



SIC Receiver

- Turbo equalizer / SIC performs multiuser interference cancellation by utilizing an iterative loop between decoding and equalization.



- Soft feedback from decoder used
- Two stages
- Reduced number of turbo decoder iterations: 3 in first stage and 5 in second stage
- Realistic channel estimation based on the DMRS

CoMP gains with one and 3 site(s) scenarios

- In reference case the Rel'8 DM RS design is used
- In CoMP the enhanced DM RS structure according to [R1-092559] is used
- Three sites CoMP (one cell/sector in each site) gain is around 25% at cell edge while cell average settles to 15%.
- One site CoMP (three cells/sectors in site) is about 10% worse at cell edge and average throughput about 5% worse compared to three site CoMP

Scenario	Cell edge throughput [kbit/s]	Average cell throughput [kbit/s]	Cell edge gain	Average cell throughput gain
Reference	381.1	810.8	-	-
Three site CoMP	507.2	952.6	25%	15%
One site CoMP	459.0	905.5	17%	10%

Conclusion

- In studied Case 1 UL CoMP with 3 sites (one cell in each site) gain is 25% at cell edge and 15% with average throughput compared to non-CoMP case.
- One site CoMP (three cells in one site) gain is about 17% at cell edge and 10% with average throughput compared to non-CoMP case. With one site case benefit is that no data transmission is needed between different sites.