Project	**IEEE 802.20 Working Group on Mobile Broadband Wireless Access** <**http://grouper.ieee.org/groups/802/20/**>
Title	**Channel multiplexing and flexible tile structure**
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Re:	IEEE 802.20 practice letter ballot 2
Abstract	The proposed channel multiplexing and flexible tile structures are modeled and simulated. Simulation results show that the cell edge user throughput can be improved significantly.
Purpose	For adoption into 802.20 standard
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Introduction

Flexible tile structure and the channel multiplexing with simultaneous support of BRCH and DRCH have been proposed in the May and March meetings [1], [2]. Some simulation results are reported in this contribution to show the benefits of the channel multiplexing and flexible tile structure as proposed in the previous meetings.

Simulation Assumptions

The simulation model is based on 19 cells, 3 sectors/cell with the following assumptions.

Parameter	Value
Number of Cells (3 sectored)	19
Propagation Model	-34.5- 35log10(d) dB, d in km
Log-Normal Shadowing	Standard Deviation = 8 dB
Base Station Correlation	0.5
Mobile Noise Figure	9.0 dB
Thermal Noise Density	-174 dBm/Hz
Carrier Frequency	1.9 GHz
Channel Model	Original SCM [3] with 6 random path arrivals
BS Maximum PA Power	20 Watts
Cell radius	1.44 km
Maximum C/I achievable	30 dB

Assumptions on system parameters are listed as follows:

1) System bandwidth: 10 MHz, with 1024 FFT
2) No. of guard subcarriers: 32
3) Primary pilot tone spacing: 16 symbols, 16 subcarriers
4) Staggered pilot tone spacing: 16 symbols, 16 subcarriers
5) Number of mobiles per sector: 16
6) Mobility: 3 km/h and 250 km/h – separate simulation scenarios
7) 1 transmit antenna, 2 receive antennas
8) Full-buffer traffic model
9) Scheduling: DRCH allocated to users who meet the criteria, followed by BRCH allocation to other users through proportional-fair scheduling
10) Link to system simulation interface method: EESM

Simulation Results

Figure 1 shows the cumulative distribution of user geometry for 100 drops, 16 users, randomly located in 1 sector.

Simulation Scenario	Mean sector throughput (Mbps)	
	User speed: 3 kph	User speed: 250 kph
BRCH-PF	16.985	11.413
BRCH-DRCH-PF	16.541	11.512

Simulation Scenario	Cell edge user throughput (CDF: 5% / 20%) [kbps]	
	User speed: 3 kph	User speed: 250 kph
BRCH-PF	225 / 400	240 / 330
BRCH-DRCH-PF	337.5 / 435	290 / 350

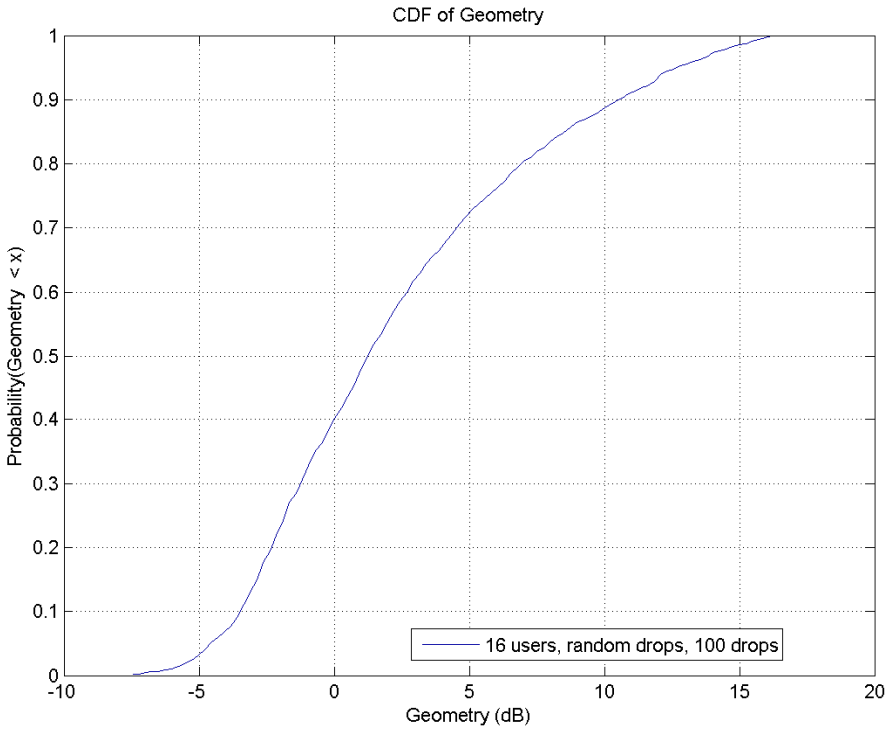

Figure 1 CDF of Geometry

2) Plots for user speed at 3 km/h

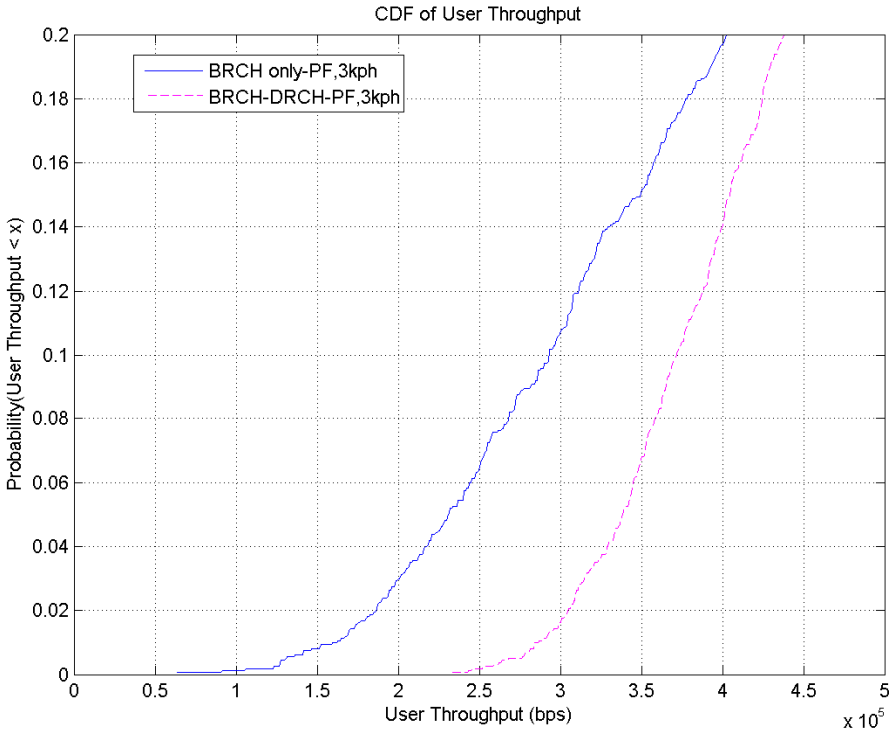

Figure 2 CDF of user throughput at 3 km/h – magnified to show cell edge performance

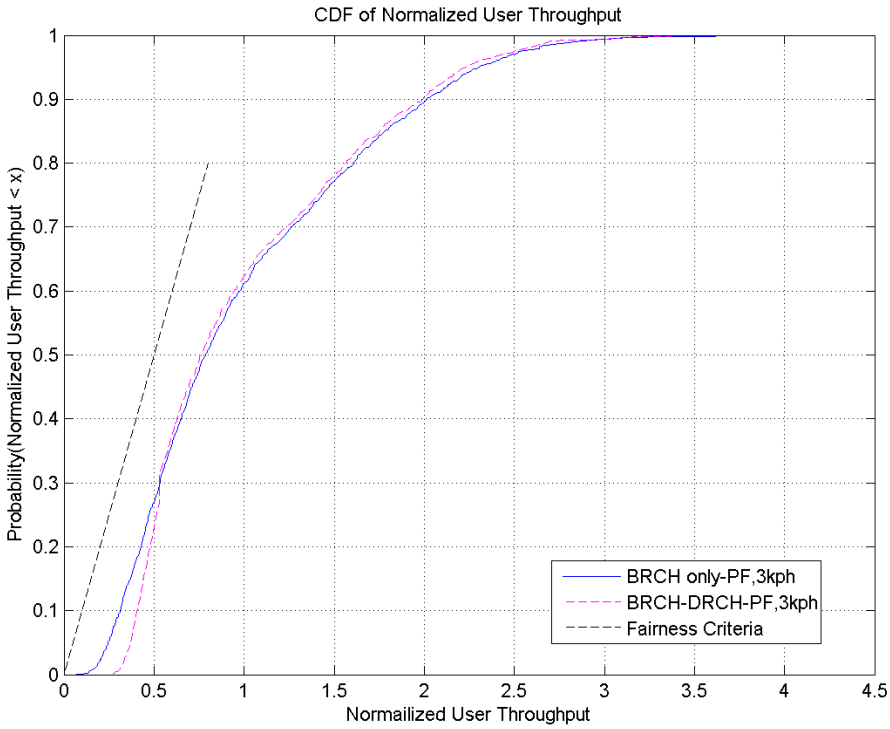

Figure 3 Normalized user throughput at 3 km/h – Fairness criteria is met

2) Plots for user speed at 250 km/h

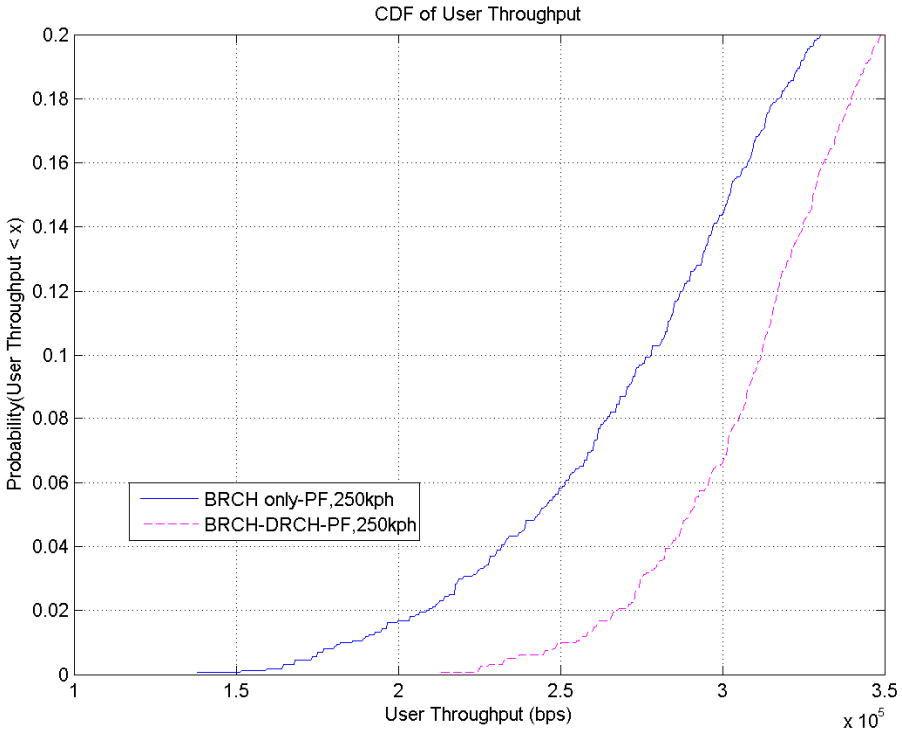

Figure 4 CDF of user throughput at 250 km/h – magnified to show cell edge performance

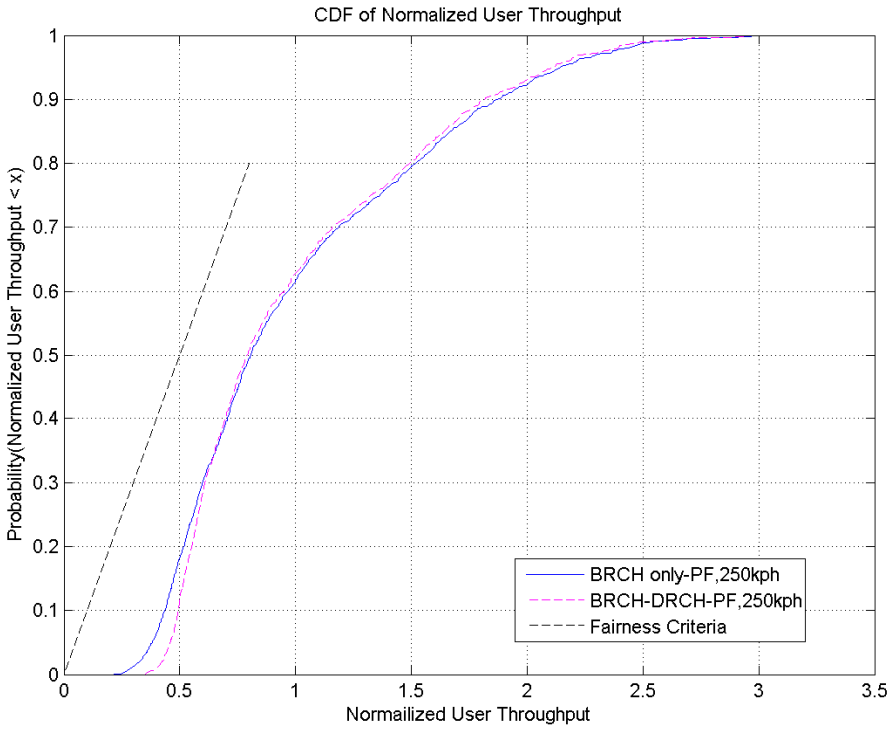

Figure 5 Normalized user throughput at 250 km/h – Fairness criteria is met

Conclusion

The channel multiplexing scheme as proposed in [1] has been simulated to show the benefits of multiplexing DRCH users with BRCH users. A significant improvement over the BRCH only case can be observed in the cell edge user throughput. A small tradeoff is observed for low mobility of 3 km/h. For the high mobility case of 250 km/h, there is no degradation in mean sector throughput, while the cell edge throughput is improved.

The simulation is also based on the support of a flexible tile structure, which has no dedicated pilot tones, as described in [2], resulting in a higher throughput as the pilot overhead is significantly reduced.

References

[1] 'Revised Partial Proposal on Channel Multiplexing', C802.20-07/19r1, March 12, 2007

[2] 'Support of a flexible tile structure', C802.20-07/33, May 13, 2007

[3] 3GPP & 3GPP2 Spatial Channel Model AHG, "Spatial Channel Model Text Description", SCM Text V7.0.