

Self-Optimization of Antenna Tilt and Pilot Power

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Presented By:

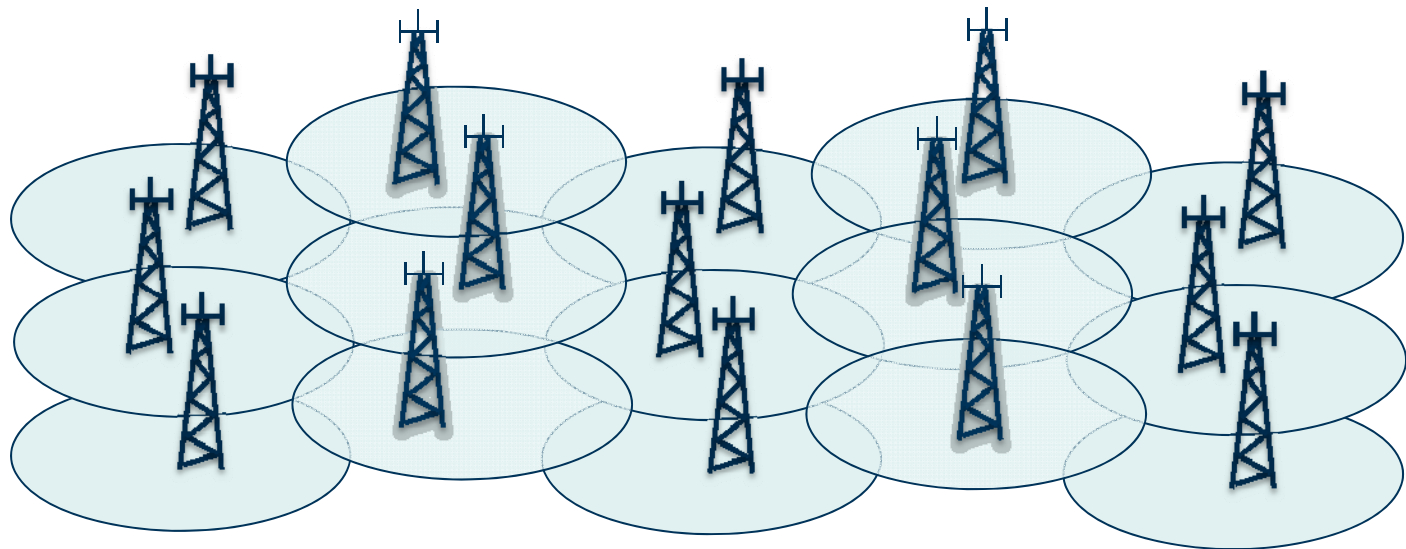
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Mobicom

- Established in 2009
- 9 Professors and 30 Doctoral Students
- Communication for disaster scenario
- Areas of Interest
 - Self-organization in communication
 - Distributed MIMO
 - Cognitive Radio
 - Information Management

Motivation

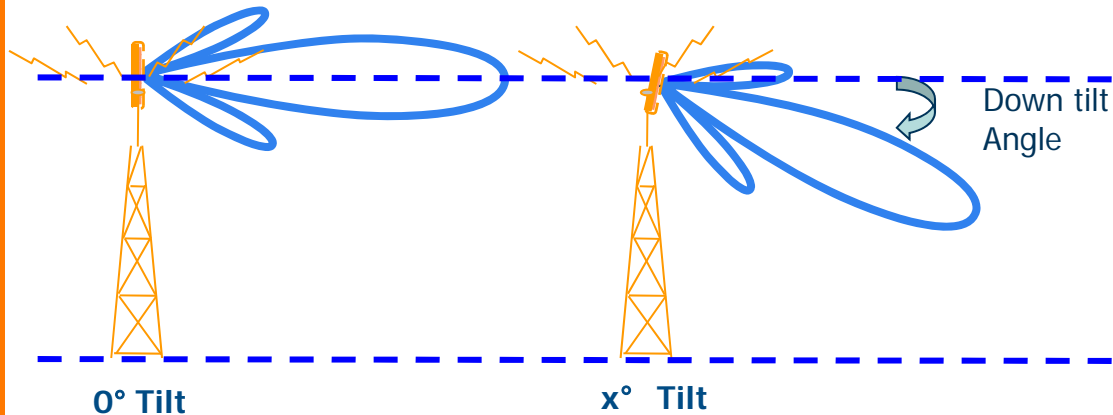


Normal load
Overloaded

Outline

- Tilt and Pilot Adaptation
- Optimization framework
- Simulation assumptions
- Results
- Conclusion

Antenna Tilt and Pilot Power

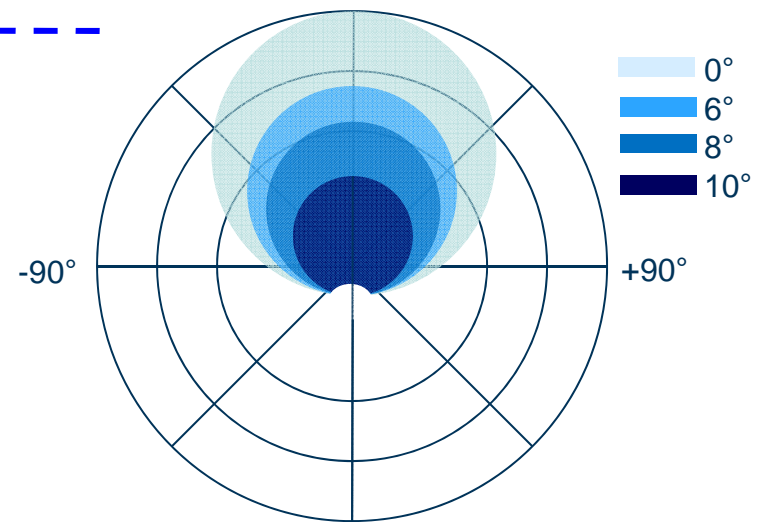


Antenna Tilt:

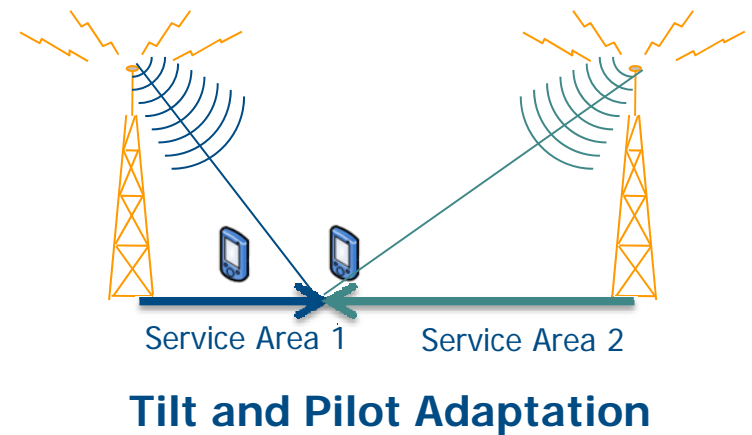
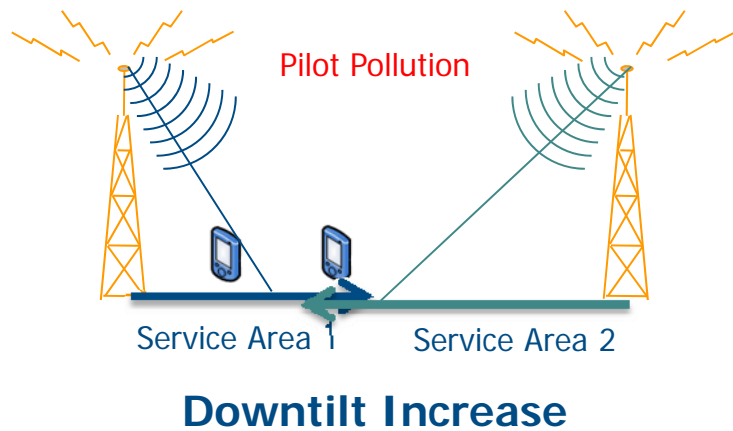
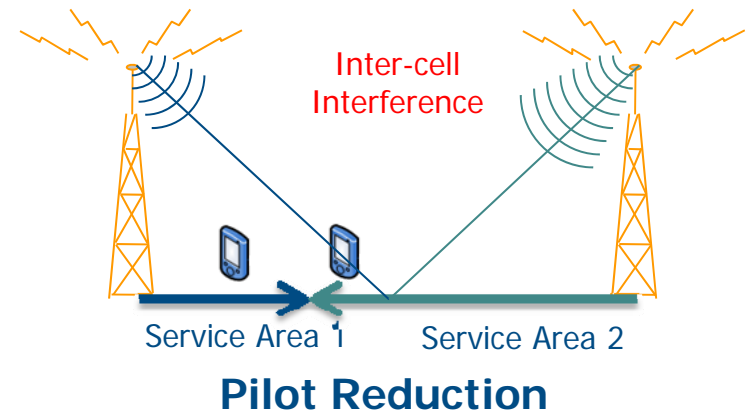
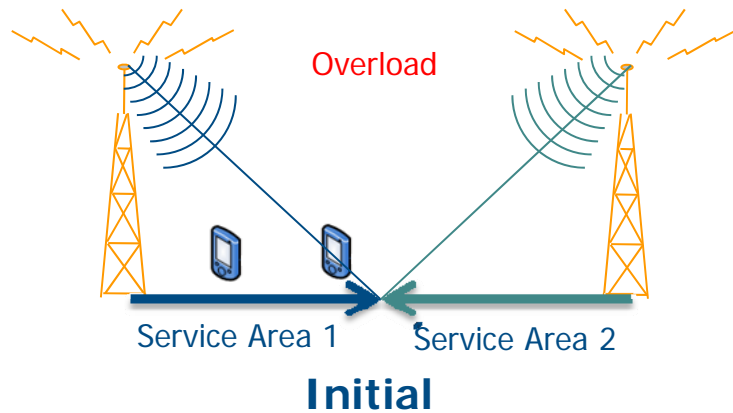
Elevation angle of the main beam of the antenna relative to the azimuth plane

Pilot:

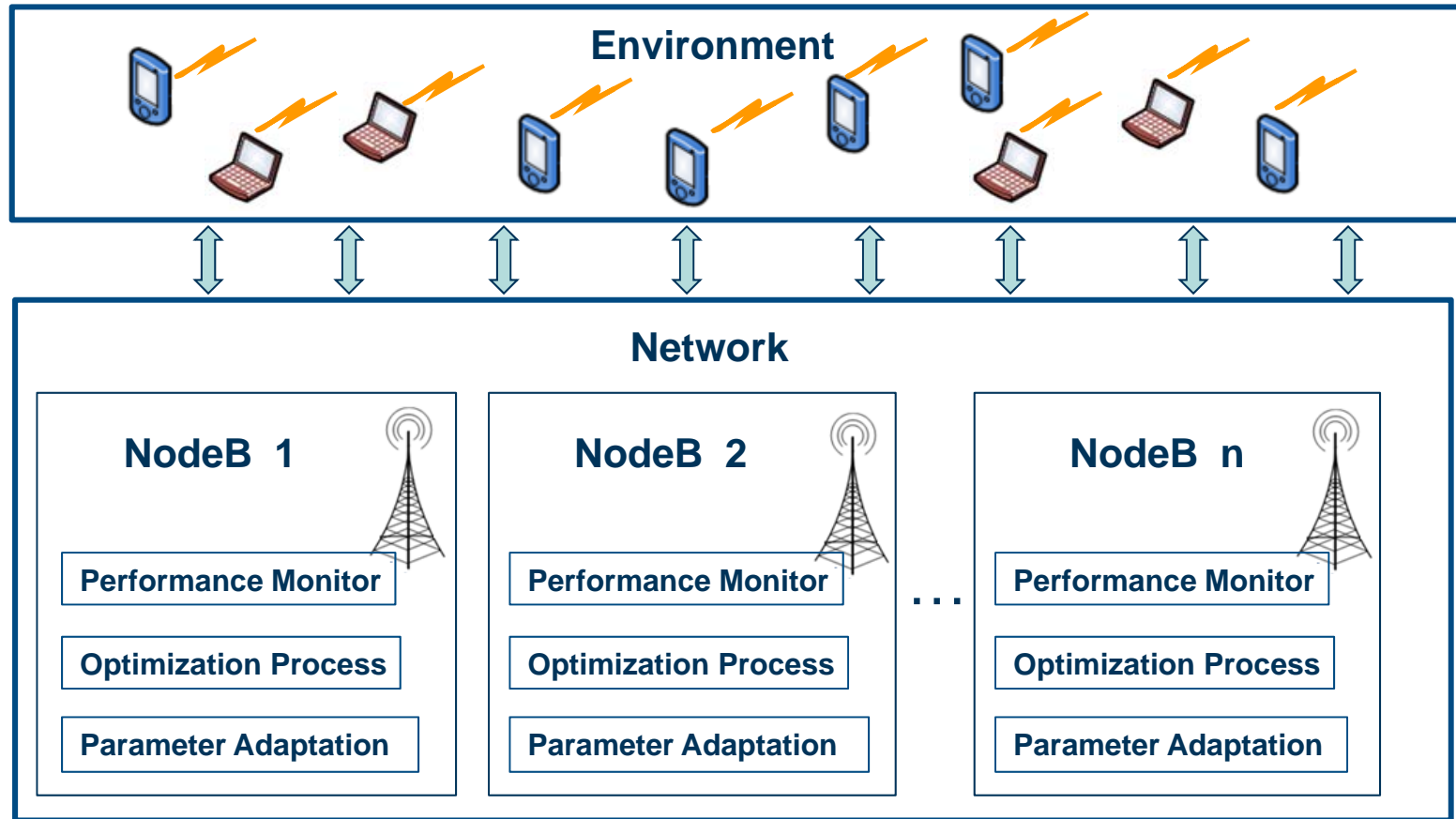
DL reference signal



Joint Adaptation

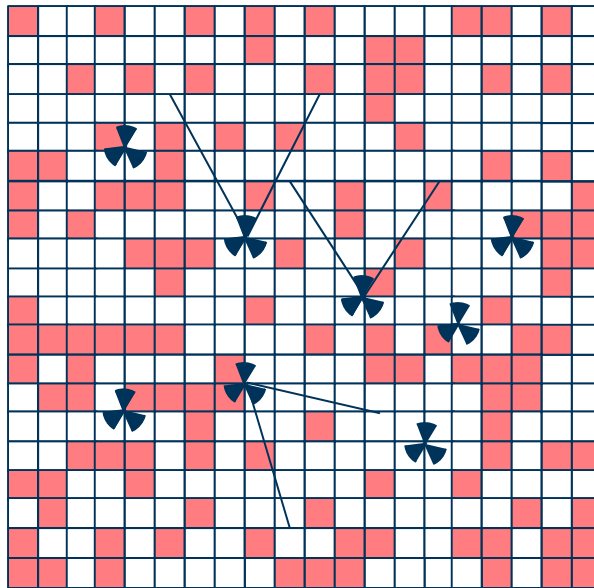


Optimization Framework



M. Naseer ul Islam, R. Abou-Jaoude, C. Hartmann, A. Mitschele-Thiel: "Self-Optimization of Antenna Tilt and Pilot Power for Dedicated Channels", 8th Intl. Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt), Avignon, France, June 2010

Coupling Matrix



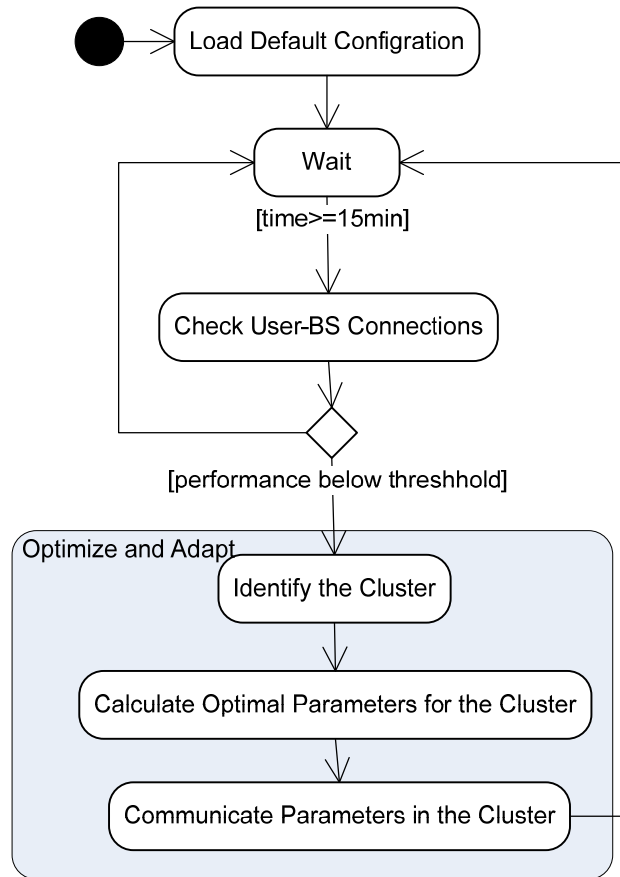
Sector ID Under
Observation →

↓
Sector ID In Decreasing Order of Coupling

	0	1	2	3
3	3	3	6	7
6	9	9	9	10
9	6	12	12	13
12	12	7	7	1
7	7	3	3	2
22	13	13	13	19
13	4	22	22	22
19	10	19	19	9
18	15	15	15	8
21	8	18	18	0
15	5	8	8	16
8	16	21	21	11
10	14	10	10	12

$$C(i,j) = \text{Pathloss}_{i,j} * \text{Gain}_{i,j} * \text{Gain}_{j,i} * \text{CPICH}_j$$

Optimization Process

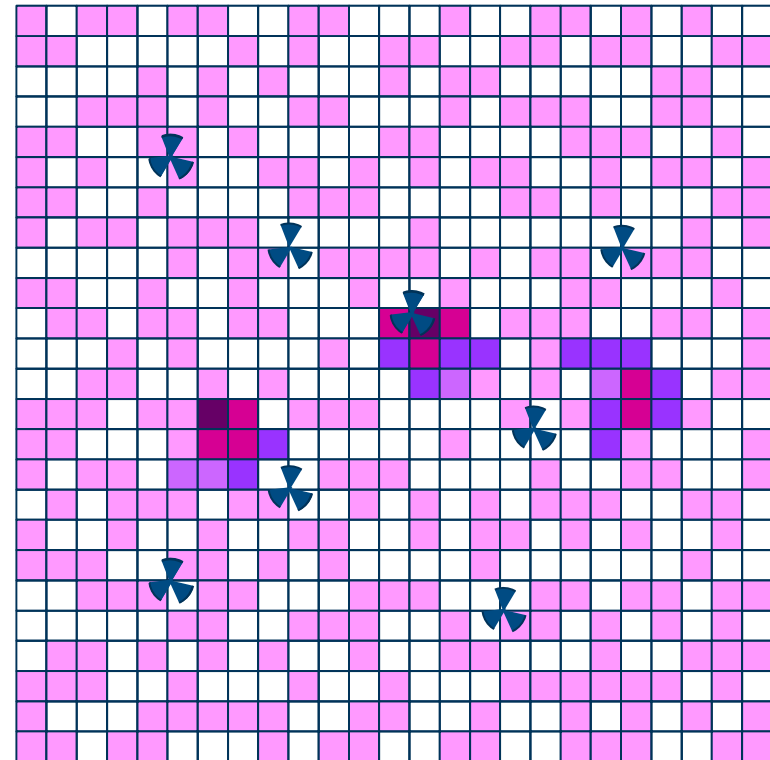


Sector 1	Sector 1	Sector 2	Sector 2	...	Sector n	Sector n
Tilt 1	Pilot 1	Tilt 2	Pilot 2	...	Tilt n	Pilot n

Simulation Assumptions

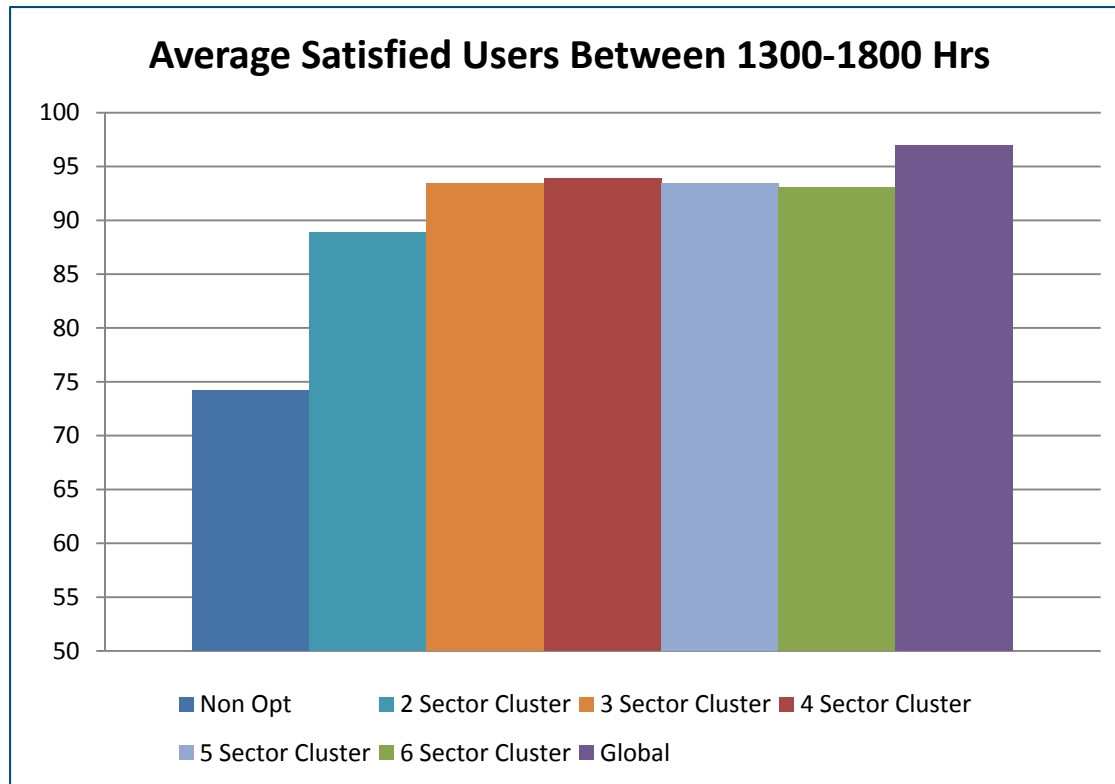
- Snapshot analysis
- Moving hotspot model
- Three traffic intensities

Sample Snapshot



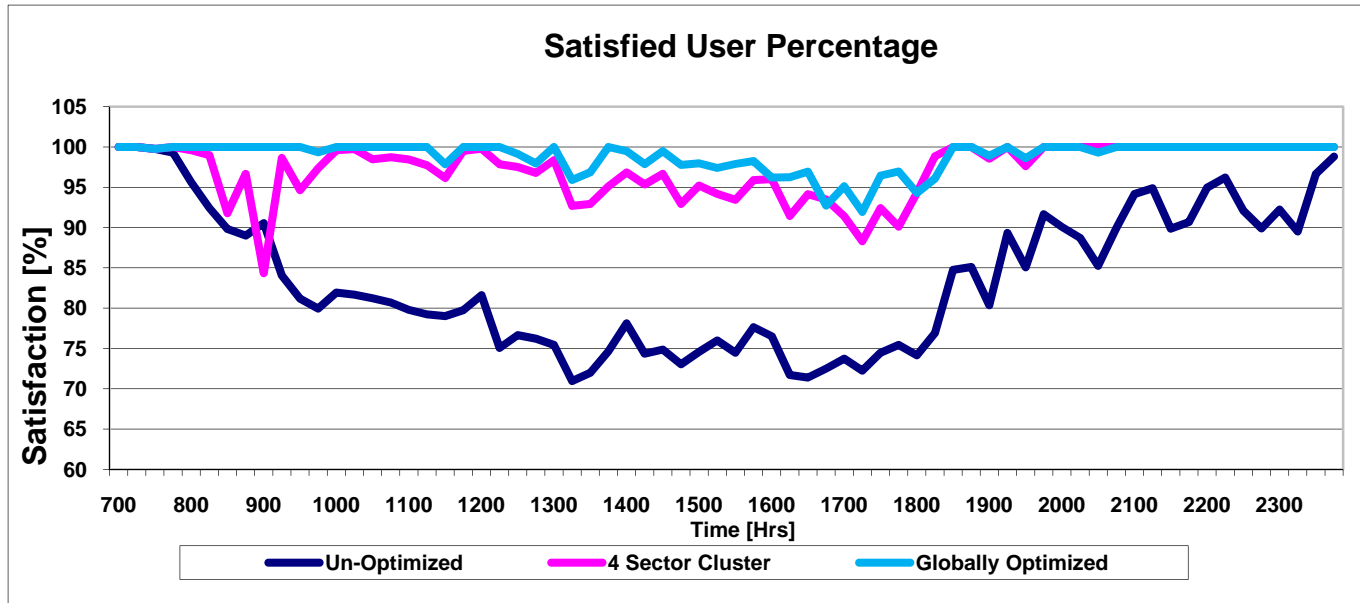
Results

- Optimal cluster size



Results cont.

- Performance improvement



Average Satisfied Users: 1300-1800 Hrs

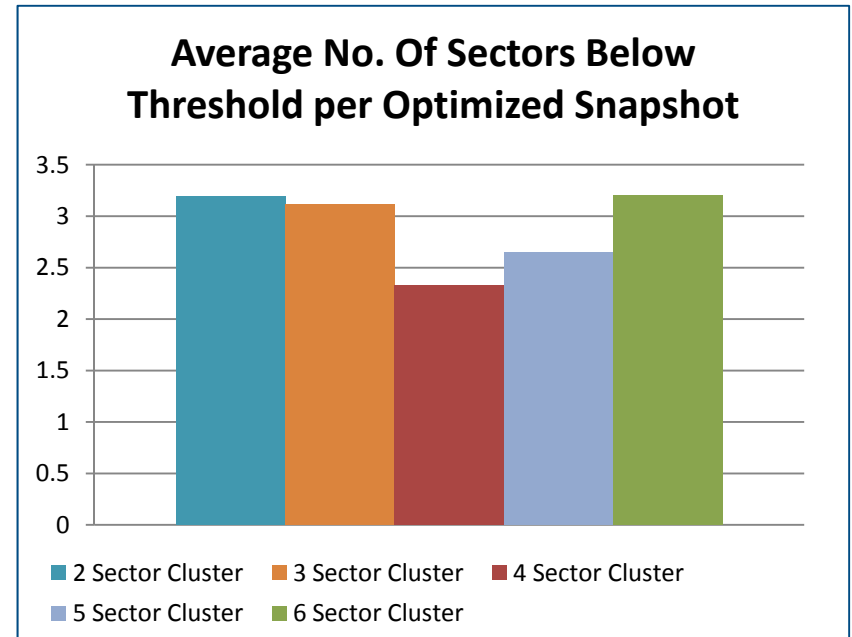
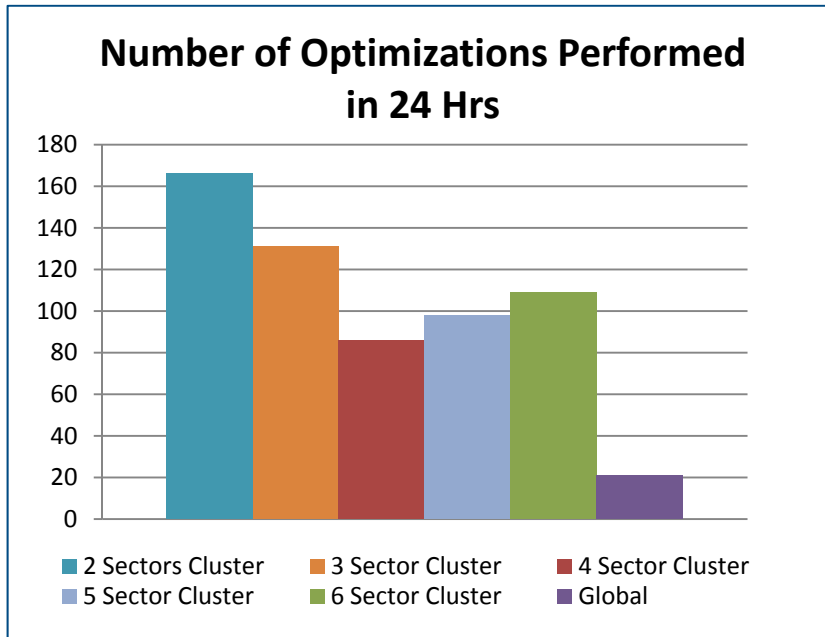
Un-optimized: 74.2%

4 Sector Cluster: 93.86%

Globally optimized: 96.93%

Results cont.

- Costs involved



Conclusions

- Conclusion
 - Presented a distributed mechanism for antenna tilt and pilot power optimization
 - Achieved performance close to global optimization
 - Performance varies with the cluster size
- Future work
 - Focus on LTE
 - Model free optimization

Thank you!

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