Traffic Adaptive Base Station Management Scheme for Energy-Aware Mobile Networks

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Traffic Adaptive Base Station Management Scheme for Energy-Aware Mobile Networks

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Background

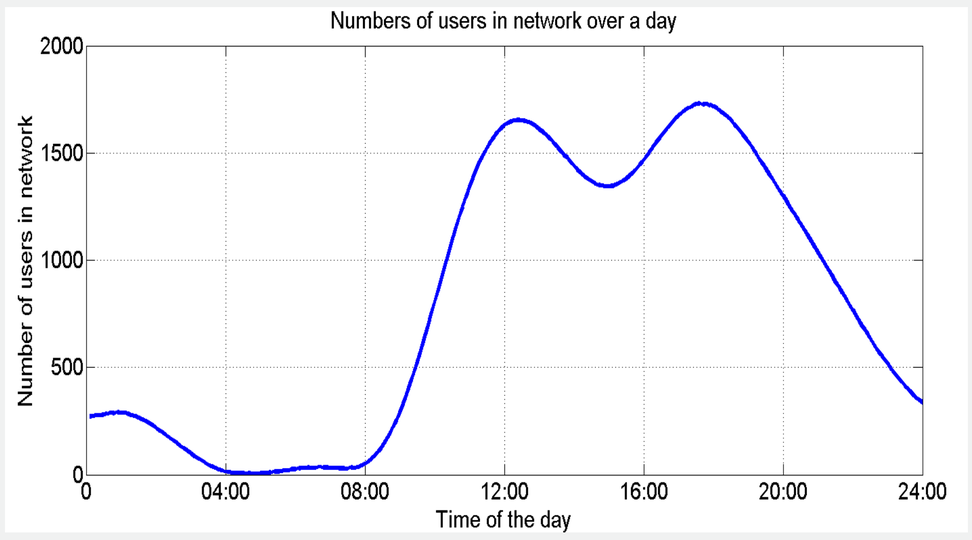
Current situation:

- Increased traffic demand must be supported by network operators.
- This leads in the deployment of multiple base stations (BSs).
- Base stations consume a large amount of energy.
- Increasing the energy consumption, the costs of the operators also increase.
- Networks must be economically feasible.

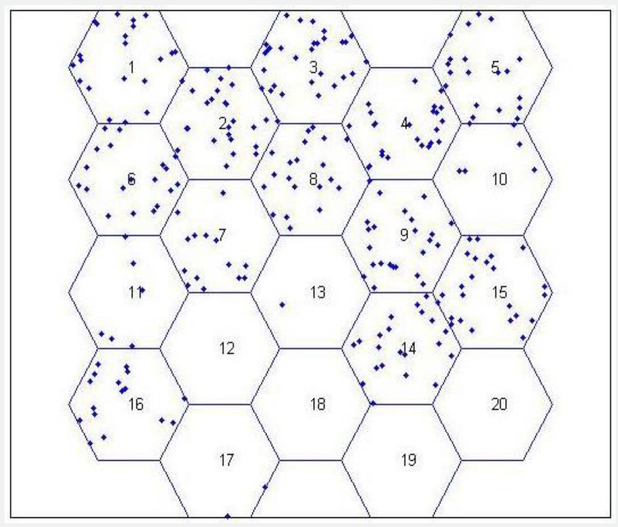
Solution:

- Reduce the energy consumption of the network.
- Focus on the base stations which use large portion of the total consumption.
- Exploit energy savings techniques on base stations switching ON/OFF schemes.
- Propose two algorithms and compare them.
- 3 different scenarios

System Model

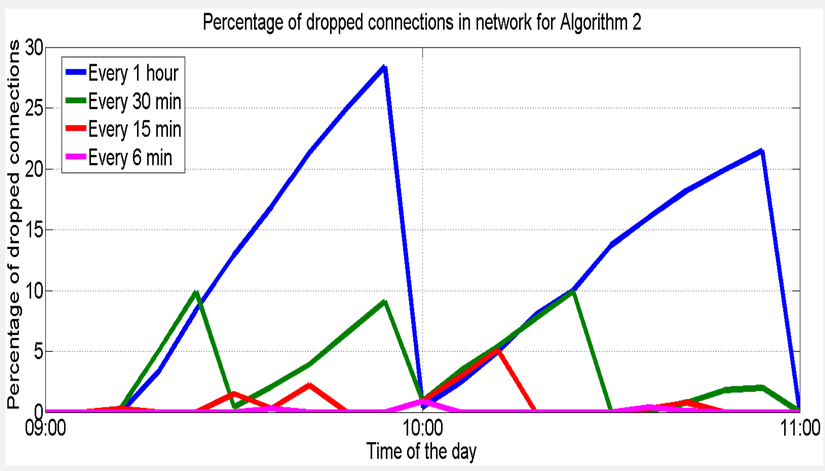


Each of the base stations follows a random traffic pattern. The traffic pattern in each of the base stations follows a sinusoidal distribution in which there is a high and a low bound. The aggregated network traffic from areas of low and high traffic.

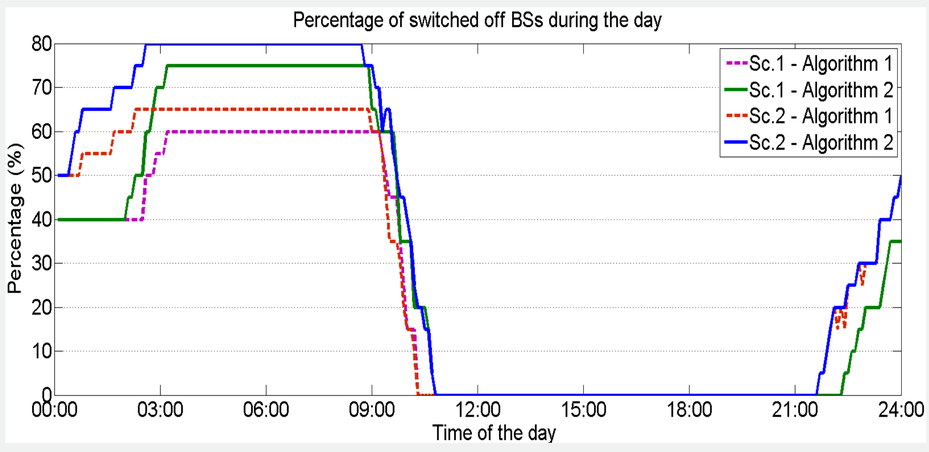


Users are generated in random coordinates inside the cell's area. The number of users in each cell is determined by the traffic pattern of each cell and the maximum users that a cell can serve. Traffic profiles, cell radius and maximum cell capacity are input parameters of the algorithm to represent a scenario of interest.

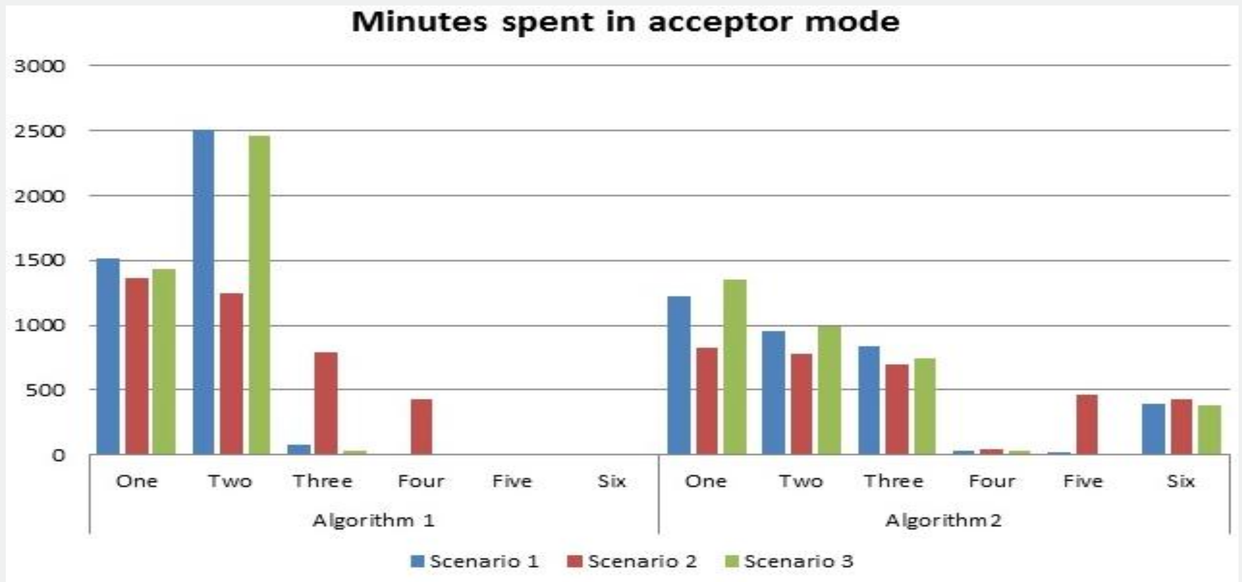
Research results

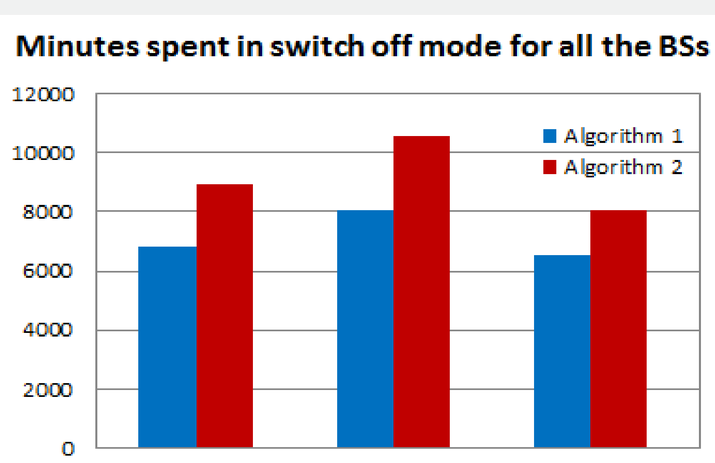


- Traffic increases drastically during the busy hours (if all the BSs peak at the same time).
- Dropped connections rate must be kept low.
- Dropped connections rate depends on the traffic pattern and the sampling frequency.



Parameter	Values		
	Sc.1	Sc.2	Sc.3
Maximum threshold	80	80	60
Minimum threshold	10	20	10
Sampling Frequency	1 hour, 30 min, 15 min or 6 min		





Each base station will sleep on average for maximum 35% of time during the day