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MAXIMAL LIFETIME, MOVEMENT CONTROL AND RENDEZVOUS IN WIRELESS SENSOR NETWORKS

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1. MAXIMIZE LIFETIME OF SENSOR-TARGET SURVEILLANCE NETWORKS

PROBLEM: Given a sensor-target surveillance network, the problem is to schedule sensors for watching targets and forwarding the sensed data to the base station, such that the lifetime of the surveillance network is maximized.

H. Liu, X. Chu, Y.-W. Leung, X. Jia, P.-J. Wan "General Maximal Lifetime Sensor-Target Surveillance Problem and Its Solution," *IEEE Transactions on Parallel and Distributed Systems*, to appear.

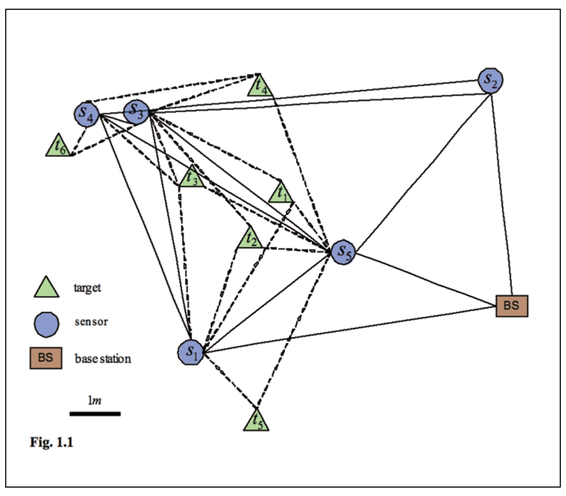


Fig. 1.1: A sensor-target surveillance network

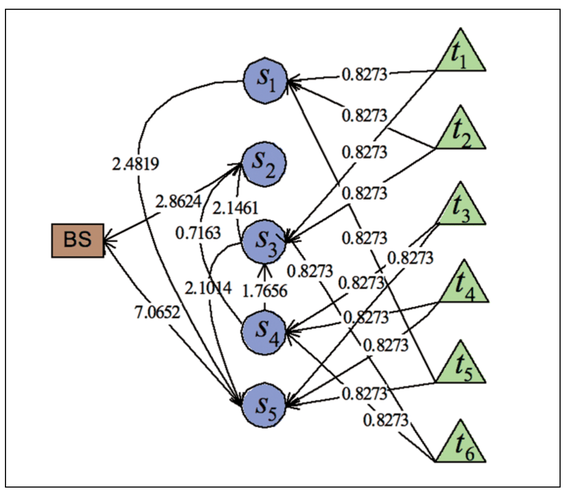


Fig. 1.2: A sensor-target surveillance tree

2. MOVEMENT CONTROL ALGORITHM FOR BI-CONNECTIVITY IN ROBOTIC SENSOR NETWORKS

PROBLEM: Robots autonomously move to the desired locations based on only 1-hop information, such that the initial and possibly disconnected network is self-organized into a bi-connected network. The objective is to maximize the coverage of the network while minimizing the moving distance of the robots.

H. Liu, X. Chu, Y.-W. Leung, R. Du, "Simple Movement Control Algorithm for Bi-Connectivity in Robotic Sensor Networks," *IEEE Journal on Selected Areas in Communications*, vol. 28, no. 7, pp. 994-1005, 2010.

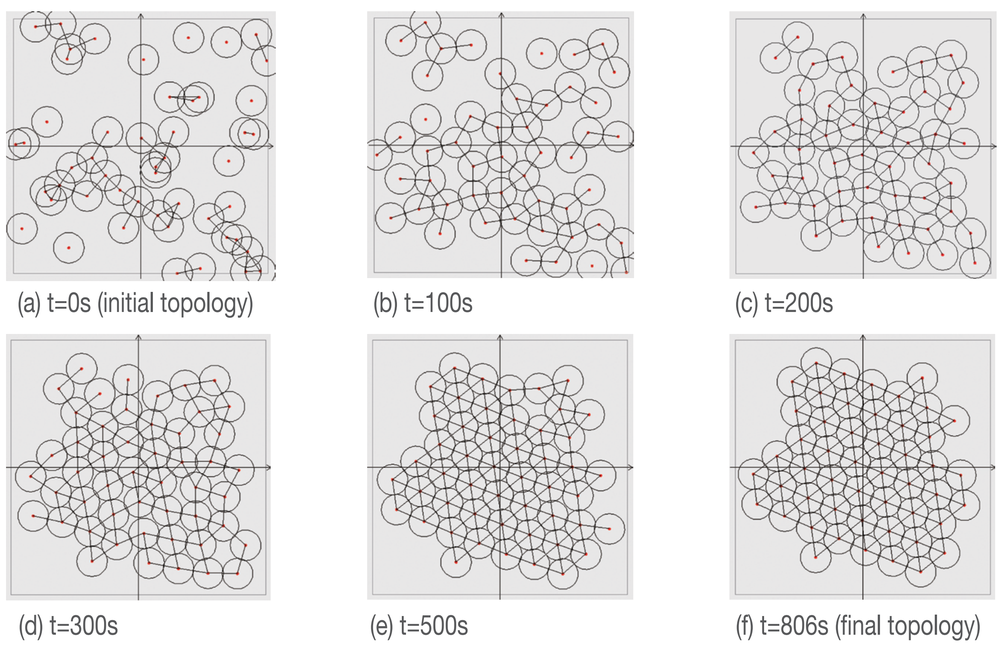
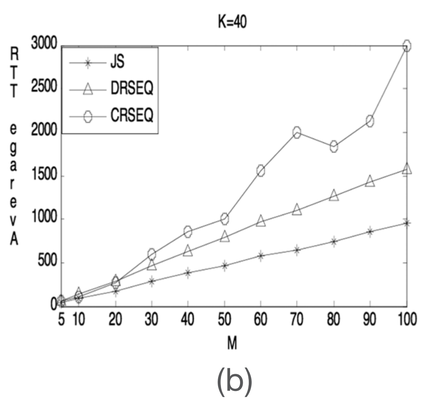


Fig. 2.1: Dynamic of movement of nodes

3. RENDEZVOUS ALGORITHM FOR COGNITIVE RADIO NETWORKS

PROBLEM: Design algorithms for blind rendezvous (rendezvous without using any centralized controller and common control channel), such that users can simultaneously hop on a commonly-available channel and thus the rendezvous is achieved.

Z. Lin, H. Liu, X. Chu, Y.-W. Leung, "Jump-Stay Based Channel-Hopping Algorithm with Guaranteed Rendezvous for Cognitive Radio Networks," in *Proceedings of IEEE INFOCOM 2011*, 2011.



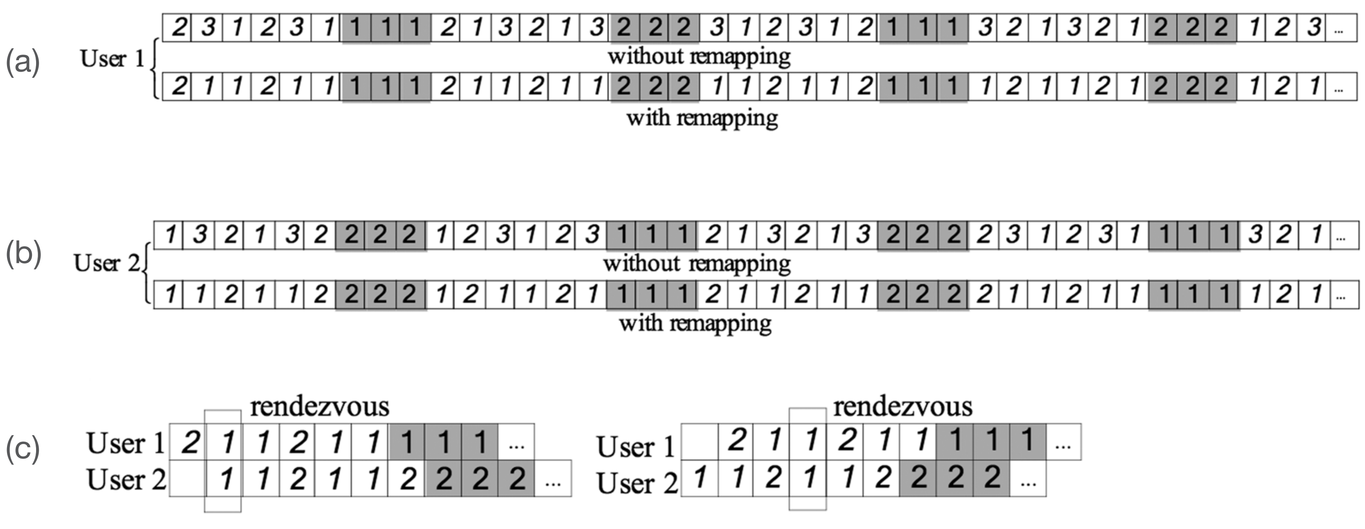


Fig. 3.1: Hopping sequences and rendezvous by using JS

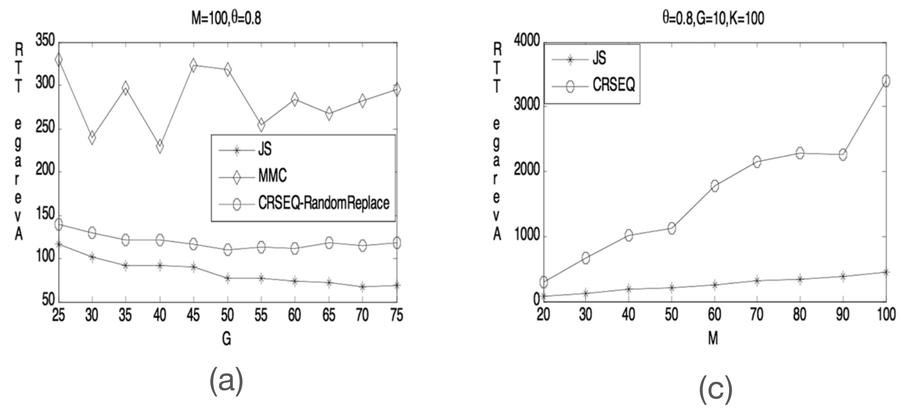


Fig. 3.2: Comparison with existing solutions