Quality of Service in Rapidly Changing Ad Hoc Networks

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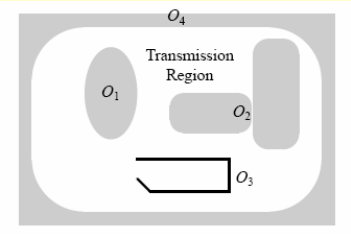
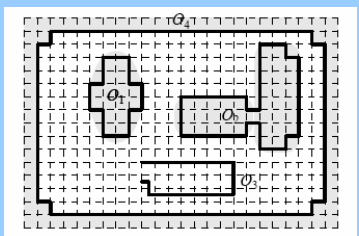
Observation that Motivates Our Work



•A wireless network consists of transmission regions and obstacles. Flows in such a network are constrained by the gaps between obstacles. These gaps are the bottlenecks.

Grid Approximation

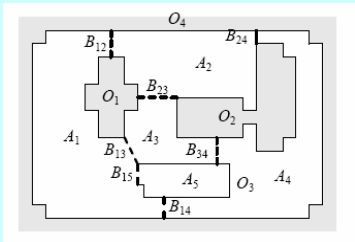


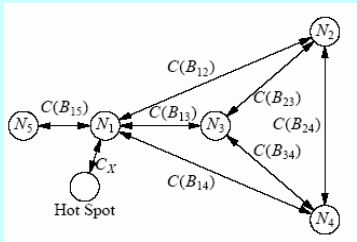
•The obstacles are irregular, complex, and difficult to store and process. In addition, the shapes change continuously as the nodes that define the obstacles move.

•The approximate structure is easier to store and process, and is more stable as nodes at the edge of the obstacle move.

Flow and Admission Control

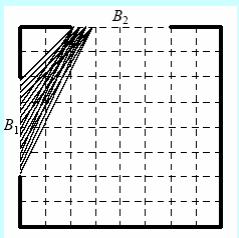
- The network is partitioned into super-nodes and links which resemble a wired network.
- Conventional routing and flow control procedure is performed to assign flows between super-nodes.
- Admission Control is applied to admit or reject a specific user within a super-node.

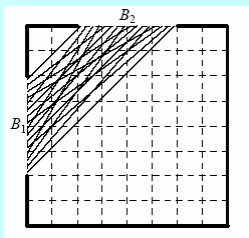


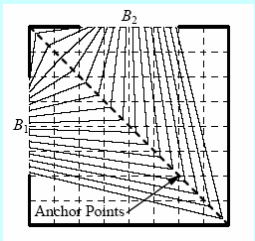


Flows within an Area

1. The objective is to spread the traffic out within the transmission area.
2. The technique is called Probabilistic Geographic Routing.
3. It is used to prevent flows between transmission regions from interfering with flows within the region.







Key Advantages

1. **More stable**
   Each super-node contains many individual nodes. As a result, the flows and routes for super-nodes are more stable than those for the individual mobile nodes.
2. **Less frequent information exchange**
   Estimated flow information is used to replace the exact flow information at a particular instant. As the number of nodes increases, the difference in performance between these two methods decreases.
3. **Scalable to a large number of nodes**
   The number of nodes that are used in the flow control techniques depends on the number of transmission regions and not on the number of individual nodes.

Future Work

•Modify two existing routing and flow control techniques, optimal routing and flow control and bottleneck flow control, in order to apply them to our super-node model.

•Test our model in Schapiro building in Columbia University and in sections of Manhattan. IEEE 802.11 units operating at 12 Mbps and 54 Mbps will be used to perform the measurements.

Contact

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