

Theory of Network Communication

Fall 2004

Assignment 7

Problem 16 (10 points):

The task of this assignment is to implement a dynamic wheel network.

Consider the space $U = [0, 1)$ and let F just consist of the function $f(x) = x + 1/2 \pmod{1}$. Suppose that we use the consistent hashing strategy to place nodes in the $[0, 1)$ interval and to assign regions to them.

Implement a dynamic overlay network that keeps the nodes organized in a doubly-linked cycle and that contains an edge (v, w) for any two nodes v and w for which there are points $x \in R(v)$ and $y \in R(w)$ so that $(x, y) \in E_F$. Three operations have to be implemented for this:

- **JOIN(q)**: this allows a new peer p to join the wheel network by contacting a peer q already in the network. It requires the **ROUTE** operation to forward a join request to the closest successor of $h(p)$ so that p can be integrated.
- **LEAVE()**: this allows a peer to leave the wheel network.
- **ROUTE(y, msg)**: this allows to route a message msg to the peer q whose region contains point y . In our context, the only relevant message is a join request.