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An Anchor Chain Scheme for IP Mobility Management

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Abstract

In recent years there has been a rapid growth in the need to support mobile hosts in communication networks. For delivering datagrams to mobile hosts, the IP protocol is augmented with a "mobility management" mechanism. The current IP standard for supporting mobile hosts is based on the home location agent approach. Although this scheme is simple and scalable, it has two main deficiencies: sub-optimal packet routing and the need for a mobile host to update its home agent of every movement, even in cases when it is far from its home. Methods for overcoming these problems are described in the literature. However, they can not guarantee that in the "worst case" they achieve lower overhead than the home approach.

This work presents a simple mobility scheme, termed the "anchor chain" scheme. The scheme combines pointer forwarding and caching methods. Every mobile host is associated with a chain of anchors that connects it to its home agent. Each anchor defines the location of the mobile host at a certain degree of accuracy. The accuracy is increased along the chain until the attachment point of the mobile host is reached. We develop distributed procedures for updating the anchor chain (Binding operation) with mobile host movements and for delivering messages to a mobile host (Delivery operation). In terms of worst case performance, the total cost of the binding operations is $O(Move \cdot \log Move)$, where "$Move$" is the total geographic distance that the mobile user has traveled since its activation. The total length of the mobile host's pointer path is linear with the distance between the mobile host and its home network, and the delivery cost is near optimal. In addition, the anchor chain of a mobile host is determined dynamically with no need for preliminary definitions of static anchors or regions. Our simulation results show that the anchor chain scheme also yields lower average overheads for both the binding and the delivery operations than other methods that are described in the literature, including the current home approach. We believe that the proposed scheme is scalable, fairly easy to implement and there fore attractive for supporting mobile hosts.