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Meridian: A Lightweight Network Location Service without Virtual Coordinates
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Meridian is a P2P location service that allows quick identification of a node close to a target location.

A traditional approach to the network location problem is to use ping latencies to a set of reference nodes as the basis for a virtual coordinate system; distance is then measured in the virtual coordinate system. The authors argue that this method introduces more complexity (and thus error) than is necessary for the location problem. Meridian instead uses ping latencies directly as distance measurements. Each node maintains a small list of peer nodes whose distance is measured by ping latency. These peer nodes are sorted by distance into a small set of bins called rings. To improve area coverage, the hypervolume of each ring (the sum of the distances between the members) is greedily maximized by dropping and adding new nodes to the list of peer nodes. Finding a node near a given location is then done by querying all nodes within the corresponding ring (who then carry out the procedure recursively). The result is a logarithmic hop count while only requiring measurement of the distance to a small set of peer nodes.

Meridian's steady-state performance is good. However, network churn can have a big impact on real-world performance. The main problem here is that fresh nodes will not have a complete set of well-distributed peers to query. Also, Internet routing transience is not dealt with. The latency measurements used to indicate distance may become rapidly outdated due to BGP. Meridian's performance depends on many parameters: ring count, ring size, peer list size, frequency of measurements, etc. The paper does not give a method for choosing these parameters.

Location services are a hot research area due to the current popularity and success of P2P Internet services and applications in future wireless networks. Future work should address the issues listed above; namely, the effects of churn and system parameter choice should be explored. Perhaps the next iteration of location services will be robust enough for integration into real P2P services.

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