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A DISSERTATION

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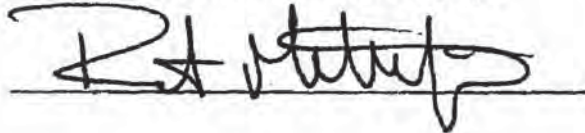
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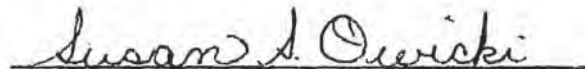DOCTOR OF PHILOSOPHY

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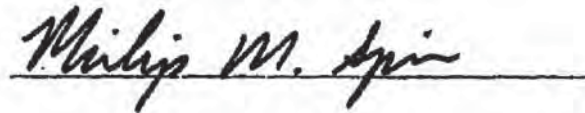(Principal Advisor)

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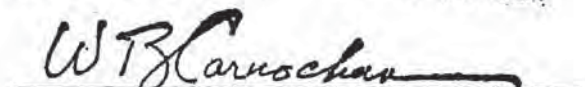
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ABSTRACT

This thesis investigates the design and analysis of broadcast routing algorithms for use in store-and-forward pacuet switched computer networks. Broadcast routing is taken here to be a special case of multi-destination routing, in which a packet is delivered to <u>all</u> destinations rather than to some subset.

We examine five alternatives to transmitting separately addressed packets from the source to the destinations. The algorithms are compared qualitatively in terms of memory requirements, ease of implementation, adaptiveness to changing network conditions, and reliability. The algorithms are also compared quantitatively in terms of the number of packet copies generated to perform broadcast and the delays to propagate the packet to all destinations. Lower bounds on the performance measures are determined for all the algorithms by examining regular graphs.

Protocols that provide reliable communication using broadcast routing, i.e. broadcast protocols, are analogous to interprocess communication protocols except that communication is between one process and many processes. Reliable broadcast protocol design is faced with problems similar to those in the design of interprocess communication protocols - addressing, sequencing, duplicate detection and guarantee of delivery. This area presents many subjects for future research.

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