C-54: Study of network adaptive routing for circuit switched networks using computer simulations

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The primary objective of this paper was to study the use of adaptive routing in a non-hierarchical circuit switched network to improve network performance under stress.

A computer simulation approach is suggested with C ++ as the programming language. The base model chosen for the study is the Colombo Metropolitan Telecommunications Network of Sri Lanka Telecom Limited. A manageable lumped model, yet appropriate for the intended study, is derived from the base model. In order to study the impact of adaptive routing on the network performance under stress, simulations are run for normal, congested and damaged networks with and without various adaptive routing algorithms.

The impacts of local adaptive routing algorithms previously suggested for military communication networks and a global adaptive routing algorithm suggested by the authors based on a k-shortest path algorithm are investigated in this paper. The performance analysis is done for local adaptive routing and global adaptive routing separately. For the simulation, 3 scenarios of network operation have been considered: (a) Congested network with all nodes operational. (b) Uncongested network with node outage. (c) Congested network with node outage.

Although one would have expected the adoption of local adaptive routing algorithms to improve the network performance, our study suggests that local adaptive routing algorithms actually degrade overall performance of fully operational uncongested networks. Suggested Global Adaptive Routing algorithm, un contrast improves the performance, especially of damaged networks, even under congestion. Performance also improves in the case of fully operational congested networks, when using the suggested algorithm.