An enhanced congestion aware adaptive routing protocol for opportunistic networks

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Abstract

The adaptive routing protocol recently proposed by researchers for opportunistic networks often makes an assumption that when each node makes an intelligent decision of choosing a best forwarder node to route its messages, the chosen forwarder will often have a large buffer storage and will always altruistically devote its resources for forwarding those messages towards their destination nodes. However, copies of messages fill up buffers on receiving intermediate nodes very quickly when few nodes become more central than the other nodes and when the connectivity becomes more and more intermittent. This paper investigates about a more realistic behavior of mobile opportunistic nodes where the storage buffer in nodes gets full very quickly, especially at the more centric nodes, when such nodes store, carry and forward messages for other nodes. Because of these practical issues, messages passed to most popular nodes just get dropped when the buffers get filled up which ultimately results in the performance degradation of the network. We investigate the cases of buffer overflow and analyze how the performance of a considered opportunistic networking environment can get degraded when buffers get overflowed. We then propose an algorithmic approach where nodes choose the potential nodes based not only on potential nodes' predicted connectivity to other nodes but also based on the other factors such as available buffer space in the potential intermediate nodes and the intermediate nodes' willingness to store, carry and forward messages for other nodes. Our initial simulation based experiment results are encouraging and indicate that a congestion aware adaptive routing protocol performs well and the overall network performance increases by means of the number of messages delivered when the message forwarding is constrained by the buffer size.