IMPACT OF MOBILITY ON NETWORK PERFORMANCE

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Abstract:

The performance of mobile ad hoc networks is highly sensitive to changes in node-to –node connections (communication links) caused by node movement. Link instability of this kind has proven very difficult to analyze mathematically, so previous work has relied heavily on simulation. This paper presents a mathematically tractable model of node motion, the constant velocity model, and uses it to derive a precise relation between mobility and connection stability. Maintaining node-to-node connectivity under complex, often random, mobility conditionsis a central problem in MANETs. Small changes in the mobility parameters candrastically affect the network performance. For example, in single-hop communication, ifa data packet is too long, mobile receiver nodes may leave the communication region of a transmitter node during a single packet transmission. Once this premature disconnection occurs, the receiver loses part of the message from the transmitter and the communication fails. Clearly, stable link connections are vital for successful data delivery in MANETs. These mobility models typically aim to provide an accurate description of the behavior of a network consisting of pedestrians or moving vehicles. It is unlikely that a single mobility model can be applied to all types of networks, and for this reason, new mobility models are being continuously developed. It has proven to be very difficult to analyze the relation between mobility models and network connectivity due to the many parameters affecting the network operation, such as node speed, pause time, node density, and transmission range.We approach the foregoing problems by setting up a relatively simple andmathematically tractable mobility model, the constant velocity (CV) model, and derive two mobility metrics for it, link duration (LD) and link change rate (LCR).

Key words: *MANET, Constant velocity model, single hop transmition, link duration, link change rate.*