The Department of Electrical and Computer Engineering

ANNA SIDERA

Title: Design and Analysis of Novel Routing Protocols for Vehicular Delay Tolerant Networks

Wednesday 4th of February 2015, 17:00 - 18:30

KENTR. A019, Old Campus - University of Cyprus

Abstract: Abstract:
We present the Delay Tolerant Firework Routing (DTFR) protocol, a protocol designed for use in disconnected Delay Tolerant Networks (DTNs) that consist of a very large number of location-aware, highly mobile nodes. Under DTFR, each data packet travels from the source to the estimated location of the destination using high-priority transmissions and a delay-tolerant variant of geographic forwarding. Once there, a number of packet replicas are created, and the replicas proceed to travel through the area where the destination is expected to be. Using simulations in an urban setting, we compare DTFR with two baseline protocols (Flooding and Spray and Wait), one recently proposed state-of-the-art protocol (GeoDTN+Nav), and an idealistic protocol of our design which we term Bethlehem Routing (BR). For a wide range of environmental parameters, DTFR performs significantly better than other realistic protocols, in terms of throughput and delay, and close to the upper performance bounds of BR. We also present an analytical framework based on stochastic geometry tools, a number of simplifying assumptions, and a small number of judiciously chosen approximations. Using this framework, we develop approximate closed form expressions for the average end-to-end throughput and delivery delay of DTFR and BR.

We also present the Extended Minimum Estimated Expected Delay (EMEED) protocol. EMEED is designed for use in wireless Delay Tolerant Networks (DTNs) that consist of a large number of highly mobile nodes with non-uniform mobility patterns. Under the EMEED protocol, any two nodes that are often in contact, either directly, or through a multihop path, disseminate in the network the expected time they have to wait until they come into contact. Nodes route packets according to routing tables created using these expected times. When its main parameter, the contact radius, is equal to unity, the EMEED protocol operates similarly to the well known MEED protocol. However, using simulations, we show that for many mobility scenarios, when the contact radius is greater than unity, the EMEED protocol performs far better than MEED, in terms of throughput and delay, with only a modest increase in the control overhead.

Biography:

Anna Sidera received the B.Sc. degree in Physics from the University of Athens, Greece, in 2001, and the M.Sc. degree in Mobile Communication Systems from the University of Surrey, UK, in 2003. She is currently pursuing the Ph.D. in Electrical Engineering at the Electrical and Computer Engineering Department of the University of Cyprus, Cyprus. Her research interests include routing protocols in wireless ad hoc networks, delay tolerant networks, and vehicular ad hoc networks.