Topic 1: Adaptive Search in Mobile Opportunistic Networks

In a mobile ad hoc network with intermittent connectivity, nodes can still communicate by transmitting opportunistically whenever wireless links are established with other nodes, physically carrying the data on the move, and forwarding the data to other nodes encountered. A network operating on these basics – also called *mobile opportunistic network*, can enable communications between nodes, which would be impossible under conventional networks that requires end-to-end connectivity between the source and the destination.

The purpose of this research is to design *adaptive search schemes* for a mobile opportunistic network. The developed schemes will provide the searching node the *best* search parameters (e.g. number of replicas of the query) adaptively depending on the network conditions (e.g. density of the network), what is being searched (e.g., a popular content or a non-popular content), and others affecting the operation of the search algorithm. Similarly, the researcher will look for solutions (such as caching) to improve the performance of the search scheme.

In the scope of this research, the intern is expected to survey the literature, design solutions, implement and evaluate their performance using the ONE simulator and various other tools. Some of the recommended reading are provided below.

References:

1- Behrouz Jedari, Feng Xia, A Survey on Routing and Data Dissemination in Opportunistic Mobile Social Networks, IEEE Comms. Surveys and Tutorials, 2013.
2- S,Bayhan, E. Hyytiä, J. Kangasharju and J. Ott, Seeker-Assisted Information Search in Mobile Clouds, ACM SIGCOMM Wrkshp on Mobile Cloud Computing (MCC), Hong Kong, 2013.
3- M.Pitkanen, T. Karkkainen, J. Greifenberg, J.Ott , "Searching for content in mobile DTNs," IEEE Int Con. on Pervasive Computing and Comms. (PerCom) 2009.

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Topic 2: Routing in Cognitive Radio Enabled Mobile Opportunistic Networks

In a mobile ad hoc network with intermittent connectivity, nodes can still communicate by transmitting opportunistically whenever wireless links are established with other nodes, physically carrying the data on the move, and forwarding the data to other nodes encountered. A network operating on these basics – also called *mobile opportunistic network*, can enable communications between nodes, which would be impossible under conventional networks that requires end-to-end connectivity between the source and the destination.

Somehow with a similar notion of opportunistic operation, Dynamic Spectrum Access paradigm (DSA) enables *cognitive radio* (CR) wireless devices (also called *secondary users*) discover the unused spectrum bands and transmit in these bands *opportunistically* till a licensed (primary user, PU) begins to transmit in this band. Both kinds of opportunism enrich the realm of wireless communications; the first in the absence or failure of a connected network, and the second in the absence of spectrum resources for the exclusive use of the nodes of interest.

In the scope of this research, the intern will design routing schemes for a multi-frequency mobile opportunistic network of nodes that are equipped with CRs. That is to say, the mobile devices can operate on several frequency bands (if multiple transceivers at the same time) and can sense the state of the spectrum (i.e., the spectrum is idle or occupied). The designed routing scheme will provide the mobile node with the frequency to tune at a time/location, and which node to communicate. The intern is expected to survey the literature, design solutions, implement and evaluate their performance using the ONE simulator and various other tools. Some of the recommended reading are provided below.

References:

1- Behrouz Jedari, Feng Xia, A Survey on Routing and Data Dissemination in Opportunistic Mobile Social Networks, IEEE Comms. Surveys and Tutorials, 2013.
2- Jing Zhao and Guohong Cao, "Spectrum-Aware Data Replication in Intermittently Connected Cognitive Radio Networks," IEEE INFOCOM, 2014.

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