L-CAQ: Joint link-oriented channel-availability and channel-quality based channel selection for mobile cognitive radio networks

Md. ArafaturRahman[ab]; A. TaufiqAsyhari[c]; Md Zakirul AlamBhuiyan[de]; Qusay MedhatSalih[a]; Kamal Zuhairi BinZamli[b]

[a] Faculty of Computer Systems & Software Engineering, University Malaysia Pahang, Gambang, 26300, Malaysia
[b] IBM Center of Excellence, University Malaysia Pahang, Malaysia
[c] Centre for Electronic Warfare, Information and Cyber, Cranfield University, Defence Academy of the UK, Shrivenham, SN6 8LA, UK
[d] Department of Computer and Information Sciences Fordham University, NY, USA
[e] School of Computer Science and Educational Software, Guangzhou University, China

ABSTRACT

Channel availability probability (CAP) and channel quality (CQ) are two key metrics that can be used to efficiently design a channel selection strategy in cognitive radio networks. For static scenarios, i.e., where all the users are immobile, the CAP metric depends only on the primary users' activity whereas the CQ metric remains relatively constant. In contrast, for mobile scenarios, the values of both metrics fluctuate not only with time (time-variant) but also over different links between users (link-variant) due to the dynamic variation of primary- and secondary-users' relative positions. As an attempt to address this dynamic fluctuation, this paper proposes L-CAQ: a link-oriented channel-availability and channel-quality based channel selection strategy that aims to maximize the link throughput. The L-CAQ scheme considers accurate estimation of the aforementioned two channel selection metrics, which are governed by the mobility-induced non-stationary network topology, and endeavors to select a channel that jointly maximizes the CAP and CQ. The benefits of the proposed scheme are demonstrated through numerical simulation for mobile cognitive radio networks.

KEYWORDS:

Channel availability; Channel quality; Channel selection; Cognitive radio; Mobile networks; Mobility