THE DESIGNING OF MANETS BASED ON COGNITIVE RADIO TECHNOLOGY

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A recent researches dealt with spectrum scarcity indicated that at any given time and in any geographic locality, less than 10 % of the available spectrum is being utilized. This problem foresees the development of cognitive radio (CR) networks to further improve spectrum efficiency.

The cognitive radio enables the usage of temporarily unused spectrum, which is referred to as spectrum hole or white space. If this band is further utilized by a licensed user (primary system), the cognitive radio (secondary system) moves to another spectrum hole or stays in the same band, altering its transmission power level or modulation scheme to avoid interference.

In order to solve the problem giving interference toward the primary system, a cognitive radio using MANETs (mobile ad-hoc networks) has been considered. MANETs can expand the communication area by relaying the data through neighboring terminals. Moreover, since each terminal transmits the signal with small transmit power, the interference toward the neighboring terminals are also small.

Specifically in cognitive radio ad hoc networks (CRAHNs), the distributed multi-hop architecture, the dynamic network topology, and the time and location varying spectrum availability are some of the key distinguishing factors. These challenges necessitate novel design techniques that simultaneously address a wide range of communication problems spanning several layers of the protocol stack. Cognitive radio technology is the key technology that enables a CRAHN to use spectrum in a dynamic manner.

The changing spectrum environment and the importance of protecting the transmission of the licensed users of the spectrum mainly differentiate MANETs from CRAHNs.

In this work, intrinsic properties, functional descriptions, and current research challenges of the CRAHNs are presented. First, novel spectrum management functionalities such as spectrum sensing, spectrum sharing, spectrum decision, and spectrum mobility are introduced from the viewpoint of a network requiring distributed coordination.

We investigate how CR features influence the performance of the upper layer protocols, and explain the research challenges on routing and transport protocols.