

An Empirical Assessment of Quasi-Permanently Vacant Channels in Mobile Communication Bands for Cognitive Radio

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Keywords: Cognitive Radio, Common control signalling, In-band signalling, Mobile communication, Radio link control.

Abstract: Basis of cognitive radio is to exploit unused frequency channels in licensed band. Recently standardised IEEE 802.22 set of cognitive radio protocols envisages fixed and nomadic receivers at below 800 MHz bands. Radio link design for this cognitive radio consider that the channels are available only dynamically to secondary users. Scanning period is thus embedded in link layer control as overhead and reduces overall efficiency of cognitive radio technology. For mobile receivers, availability of permanent channels for radio link control is essential for in-band signalling. Existing mobile communication system uses CDMA 800, GSM 900, GSM 1800 and WCDMA 2000 MHz bands for which approximately 1/8th of the band capacity is used for in-band signalling. Present work provides an assessment of vacant channels in mobile communications range which were permanently available at the time of measurement. The study used conventional Radio frequency scanners available for different bands and dedicated engineering handsets for tracking active frequencies. The tests were performed with assemblies carried in a vehicle and across the length and breadth of each city. The allotment of frequencies by Frequency Regulatory Authority to local mobile operators along with the frequency bands reserved for further distribution were also considered. The experimentally collected data were analysed using RF analysis software and spread sheet database. An analysis of the collected data lead to arrive at the conclusion that more than 1/8th part of resources of each band are nearly permanently vacant which is enough to design in-band common control signalling methods for cognitive radio. Also, with the help of collected data of eight cities, an empirical relationship has been established which can be taken as a thumb rule for projection of channel occupancy from densely populated core areas of big cities to less populated township areas when population is known.



Neeta Nathani was born in India in 1981. She received the B.E. and M.Tech. degrees from Rajiv Gandhi Proudyogiki Vishwavidyalaya, India, in 2003, and 2009, respectively. She joined Sri Ram Institute of Technology, Jabalpur, India, in 2003 and worked there for few years. Since 2008, she has been with Gyan Ganga Institute of Technology & Sciences, Jabalpur, India where she is currently an Assistant Professor. Her main areas of research interest are Wireless Communication, Quality of service of Cognitive Radio.



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