Currently, wireless networks and applications in much of the world are characterized by a fixed allocation policy on radio spectrum regulated by the state. This causes fixed assignment of frequencies allocated for specific services are virtually obsolete and cannot be used by unlicensed users, even if they do not introduce any interference (Akyildiz I., Lee, Vuran, & Mohanty, 2008).

According to studies by the Federal Communications Commission United States (Federal Communications Commission, 2003) has shown that much of the radio spectrum is being inefficiently used. Based on the temporal and geographical variations in the use of spectrum allocated is approximately 15% to 85%, with a strong dependence on time and space (Federal Communications Commission, 2003) (IEEE, 2006). Even most recent measurements show that over 70% of the spectrum is not being used (Hoven, Tandra, Sahai & 2004).

This inefficient use of spectrum and sporadic, the increased demand for spectrum, have led to degrade the quality of service on various networks and wireless applications such as cellular network. This has motivated the development of recent research that found in the dynamic spectrum access the solution. The key enabling technology to realize the techniques of dynamic spectrum access is the Cognitive Radio (Akyildiz I., Lee, Vuran, & Mohanty, 2008).

Cognitive Radio concept was created by Joseph Mitola III in 1999 as "the point at which the wireless PDAs and related networks are, computationally, smart enough about radio resources and related computer communications a computer to detect any communication needs of the user as a function of context of use and provide radio resources and wireless services most appropriate for that moment "(Mitola & Maguire, 1999). However, several major institutions have given their views about it, according to the National Information and Communications (NTIA), cognitive radio is a radio or system that senses its operational electromagnetic environment and can dynamically adjust and autonomously radio operating parameters to modify system operation and maximize performance, reduce interference and / or facilitate interoperability (National Telecommunications and Information Administration, 2005). According to the International Telecommunication Union (ITU), cognitive radio is a radio or system that senses and is aware of their surroundings and can be adjusted dynamically and autonomously according to its radio operating parameters. According to the Institute of Electrical and Electronics Engineers (IEEE), cognitive radio is a type of radio that can autonomously detect and reason about their environment and adapt according to this (IEEE 2006).

According to the Federal Communications Commission (FCC), Cognitive Radio is a radio that "can change the parameters of the transmitter based on interaction with its environment" (Federal Communications Commission, 2003), which gives the ability to provide high bandwidth to mobile users over heterogeneous wireless architectures, significantly increasing the

spectral efficiency because it allows unlicensed users to share spectrum with licensed users opportunistically (Akyildiz I., Lee, Vuran, & Mohanty, 2008) . This does not pose a legal problem to the extent that the user does not occupy any frequency licensed permanently.

In 2004, the Federal Communications Commission proposed a rethinking of current wireless network architectures with new Cognitive Radio based networks, allowing unlicensed wireless devices could use free TV channels (Aguilar Renteria & Navarro Cadavid, 2011).

Each time there is a spectrum handoff operation parameters of the cognitive radio network changed to minimize the impact on the operation of cognitive radio users in order to meet quality of service (QoS) (Hoven, Tandra, & Sahai, 2004). The main features of cognitive radio, which give all the capabilities described above, are cognitive ability and reconfigurability (Software Defined Radio, SDR). Cognitive ability is the technology to capture information from their environment to identify radio frequency spectrum segments that are not being used, select the best possible range and define the most suitable operating parameters in order to avoid interference with other users. The reconfigurability is the ability to dynamically change, the different operating parameters related to transmission and / or reception, such as frequency, power and modulation in order to enable the radio to be programmed dynamically to transmit and receive on a range of frequencies depending on the radio environment, and using different access technologies to the transmission, supported by its hardware design (Aguilar Cadavid Renteria & Navarro, 2011) (Akyildiz IF, Lee, Vuran, & Mohanty, 2006).

All-in-all, dynamic reconfigurability features of each of the operating parameters in a cognitive radio network can guarantee data integrity, interoperability, reliability, flexibility, redundancy, scalability, security, efficiency and access across time and space , significantly benefiting the information management and communications in Colombia.

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