

# Cloud-Based Routing Resource Allocation in Cognitive Radio Networks

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**Abstract**— Wi-Fi Direct technology is enabled to support multiple services to be done via Wi-Fi connection. It provides the most efficient method to develop ad-hoc community among mobile devices for connecting quickly with one another without needing an access to network. It allows to communicate at common Wi-Fi rates for various applications including document exchange and online connection. This one-Stop WiFi Direct application is able to connect a device to a single device at a time, i.e., only peer to peer communication is allowed within one hop. Hence, multi-device communication within multi-hop distance in a trusty Cognitive Radio (CR) network environment is in demand. This paper presents the development of an Android based application with optimum cloud routing service to transfer files or chatting via Wi-Fi Direct technology in CR network. A system is developed using smart phones (with developed applications) and nodes with WI-FI connection. An indirect multi-hop routing approach is created if more devices transfer files simultaneously from hop to hop. After login and initializing, a device discovers the neighboring nodes first and then connects those (as necessary) to transfer file or start chatting. The very moment a connection is established, a log file is generated in internal memory and save a backup copy in cloud containing necessary networking information of the client devices. The aim of these backup log files is for forensic investigation for intrusion detection/prevention and secured communications. Then the chatting or file transfer is carried out between the connected devices either in single or multi-hop routes. Results show that the system's efficiency is around 92%. It shows that multi-device, multi-hop Wi-Fi Direct services can be implemented using Android devices with Eclipse Java programming in CR networks.

**Index Terms**— Cognitive Radio Network, Cloud-based Routing, Peer to Peer Multihop Communications, Wi-Fi Direct, and Resource Allocation.

## I. INTRODUCTION

The benefits of Wi-Fi Direct is the capability to make link among products from various companies. The units should be agreeable with Wi-Fi Direct to determine a peer-to-peer hookup that exchanges information immediately between one another with considerably minimum setup. The "pairing" of Wi-Fi Direct gadgets may be created for the need of a whole area interaction, a Wireless transmission for all of the units. Wi-Fi Direct might not just change the necessity for routers, but may in addition replace the necessity of wireless access point with programs which do not depend on reasonable energy [1-5].

Android OS is a Linux-based cellular phone OS created by Google. Android is exclusive working platform because it

provides information and guidelines to use in hardware and smart phones [6-7]. It comes down set up on a number of smart phones and tablets, supplying customers' accessibility to Google Chrome, YouTube, Maps, Gmail, etc. just like a PC.

Analysis provide that cloud storage do have more strengths for subsequently different competing storage strategies. Data stored in cloud storage, can be access from anywhere that features online accessibility. Together with the proper storage space program, one can actually enable other individuals to gain access to the information, flipping a private task into a collective work. This proves that the cloud storage is very convenient for the user as it is very flexible for use [1-7].

The reason cloud is chosen for this research is to store data and routing path automatically in the cloud. This can be easy for node tracking purpose. Every time a new path is taken, the routing path can be backed up in cloud in the form of log file. By backing up the routing path, may enable the use of log files for further analysis for security purpose. By accessing the log file, any third party node or hackers who try to tap information from the path can be traced.

One of the major promising feature that the Cloud provide is Auto Backup. Data can be backed up in background without bothering the user once this configuration is set up. Even though, the device is turned off during the preset back up time, data can be backed up the moment the device is switched on when there is internet connection [6-10]. Besides, the cloud storage has feature called the archive backup, which enable the cloud to update the storage with new copy of data each time there is an update done to the data file while preserving a copy of old file for each version with time-stamp. Users are allowed to access their data stored in cloud only when they provide the right login information and password. Besides that, data can be encrypted while storing and retrieving data from the cloud. This can prevent the intruder from tapping the data [8-9].

Cloud routing have many advantages though there are some issues regarding routing algorithm need to be resolved. One of those is cloud routing consume very high energy in ad hoc networks. The main reason ad hoc network consume energy is due to the attempts to search and transfer packets to the next participating node in an acquired route. The distance between nodes also another important contributing reason for the total energy consumption. This drains the mobile device's stored energy quickly. So, the best routing protocol need to be chosen. Besides, internet connectivity is essential to transfer files or documents to cloud for each node. Users