CHAPTER I

INTRODUCTION

1.1   Background

The development of cellular network technology is growing, triggered by 4G LTE technology (Long Term Evolution), but it is undeniable that 3G HSPA technology is still the choice of users, as seen in Figure 1.1 where 3G HSPA technology is still an option in Indosat West Java, where technology still contributes to data profiles as much as 40% to 45%.
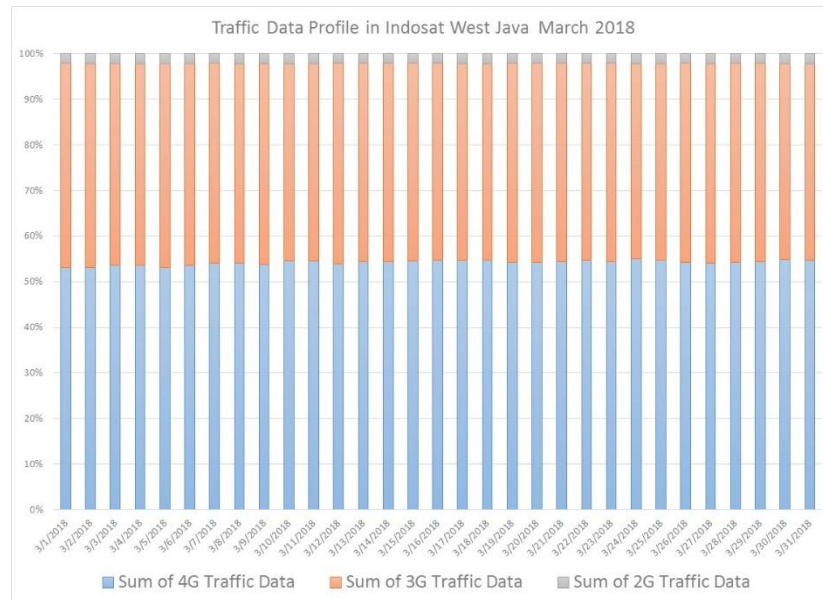

Figure 1.1 4G-3G-2G Data Volume Profile

The evolution of HSPA can be one of the keys to radio access technology with the aim of efficiency of cellular operator costs. Multi-carrier HSPA is introduced to increase spectrum efficiency and reduce latency on the network. HSPA multi-carrier dual carrier or dual band system aims to increase the throughput of cells on the user side up to 42

Mbps [1]. The system generally requires the aggregation of two carriers in the same frequency band, ie two carriers UMTS 2100. However, PT. Indosat, Tbk (INDOSAT) has the allocation of the UMTS 900 band as a third carrier so it seems as if the HSPA multi-carrier technique can not be implemented properly. Therefore, 3GPP Release 9 has defined rules that allow carrier aggregation in different frequency bands, for example the UMTS 2100 and UMTS 900 bands known as dual band (DB) HSPA. And as in the picture 2 pair aggregation UMTS2100 and UMTS900 are general or standard configurations for Dual Band HSPA according to Huawei system [5].

With HSPA Dual Band technology enabled [5] [6] uplink load resources will increase and this can make network performance decrease in the event of an uncontrolled uplink load addition [11] [12].

In this research to overcome the problem of uplink load will try to use load balancing simulation using Link Imbalance and Fuzzy Logic.

1.2   The Research Objectives

The purpose of this study is to improve network performance after the activation of Dual Band HSPA by taking into account the problems that will exist, namely the addition of uplink load [5]. This research can also be used as an evaluation and consideration for INDOSAT in dual band HSPA activation

The method used to improve network performance and guarantees after the activation of Dual Band HSPA is the calculation method of link imbalance analysis which takes into account the actual load uplink factor with the final recommendation. Load balancing uses Link Imbalance and uses fuzzy logic as a method of making traffic sharing decisions for the Base target Station to be shared.

1.3 Limitation and Requirements

Therefore problem formulation and problem limitation carried out for the preparation of the thesis are as follows:

a. Use actual data for uplink load calculations

b. Using the Load balancing method in dedicated conditions using the CIO Offset method which also defined in link imbalance

c. Consider the same downlink power condition between the two reference reference points

d. Using Indosat network data in one region and Huawei devices and systems

e. Using fuzzy logic method for making traffic steering decisions

1.4 Research Methodology

The research method in this thesis is as follows:

- Study of literature and scientific studies

With the development of communication technology, the speed of data access or throughput in the HSPA network is absolutely done "aggregation" in the form of multi carrier (Dual Carrier) or multi band (Dual Band) [1]. Meanwhile, according to [6] with the activation of Dual Band HSPA will provide a new problem that is the increase of uplink load. With uplink load upgrades, and different uplink load conditions at each site in one region. One solution to traffic offload is to use traffic steering [2]. And the ideal traffic steering method for multi carrier or multi layer conditions with different uplink and downlink load capacity conditions is to use imbalance link analysis with its recommendations on the dedicated conditions of CIOOffset [3] [4]. However, in research [3] [4] more emphasis on downlink factor only while activation Dual Band

HSPA problem lies more on the condition of uplink. Figure 1.2 shows a mapping picture of the literature study or reference tracing used
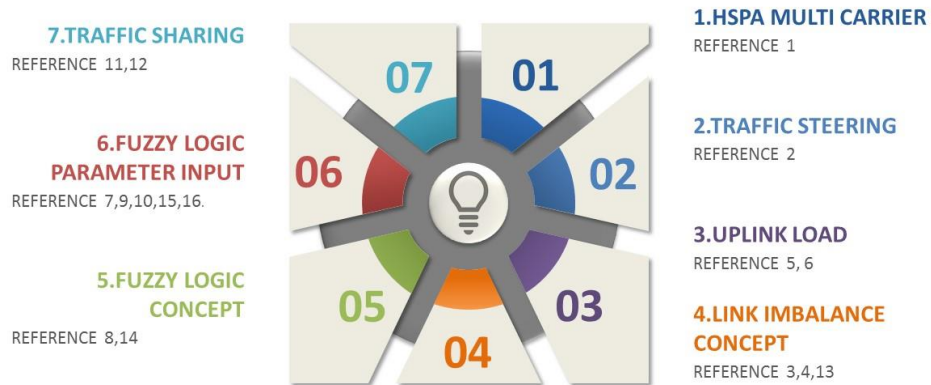

7.TRAFFIC SHARING
REFERENCE 11,12

6.FUZZY LOGIC PARAMETER INPUT
REFERENCE 7,9,10,15,16.

5.FUZZY LOGIC CONCEPT
REFERENCE 8,14

1.HSPA MULTI CARRIER
REFERENCE 1

2.TRAFFIC STEERING
REFERENCE 2

3.UPLINK LOAD
REFERENCE 5, 6

4.LINK IMBALANCE CONCEPT
REFERENCE 3,4,13

Figure 1.2 Reference Tracing Mapping

- Design Process

In this research plan is divided into several main parts, namely designing a new calculation / algorithm for link imbalance analysis in the previous study the uplink load factor was only considered as a reference and emphasized the downlink load factor. For the new calculation the authors propose is to do the opposite where the downlink load factor is a reference while emphasizing the uplink load calculation as an analysis of the calculation of the impact of the Dual Band HSPA activation This research is also to examine network performance, a new method is proposed. Design research will be discussed as follows.

a. Determine the purpose of improving network performance and guarantee

b. Determine success indicators. For calculation of imbalance link analysis using uplink load value <10 dB as initial requirement

c. Take input data needed such as Engineering Parameters and actual data from the counter performance

d. Perform imbalance link calculation and simulation

e. Analyze results and provide recommendations according to the new algorithm proposed and determined

f. Evaluation and verification

1.5   Hypothesis

For the imbalance link analysis method [3] [4] it is focused on the downlink side, while the problem will arise from uplink side [5], therefore the use of imbalance link analysis on the uplink side will solve the problem.

By using additional simulation as well as imbalance calculation technique and recommendation of handover offset, uplink load factor which becomes a problem or constraint can be reduced despite the activation of dual band HSPA so that purpose of network performance improvement and guarantee can be achieved and more optimal