



## VERSATILE ALLOCATION OF RESOURCE BLOCKS TO CONTROL RATE AND POWER IN OFDMA BASED BASE STATION

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### ABSTRACT

As portable learning activity levels have upgraded exponentially, prompting rising vitality costs as of late, the interest for and improvement of unpracticed correspondence advancements has brought about shifted vitality sparing styles for cell frameworks. At a proportional time, late mechanical advances have permitted numerous component carriers (CCs) to be in the meantime used in an exceptionally base station (BS), an improvement that has made the vitality utilization of BSs a matter of quickening concern. Computerized flag prepare came courses from wire-based glass fiber correspondence to remote based high rate upheld correspondence models. Radio waves upheld long separation satellites, radars to microwave bolstered mobiles has altered as far as innovation and rate in last 20 years. As versatile information movement increments there is inaccessibility of force at base station. So we will actualize versatile asset planning calculation to give control adaptively.

**Keywords:** component carrier, energy saving, green communication technology, OFDMA, SUI channel model.

### 1. INTRODUCTION

Now-a-days quantities of clients are expanded in Telecommunication industry and they require high information rate, and system access from anyplace. So the remote correspondence innovation needs more vitality or power, while utilizing more power it discharges some undesirable gasses called CO<sub>2</sub> into nature, the International Telecommunication unit (ITU) declared that the ICT (data and correspondence Technology) discharges 2% - 2.5% of aggregate nursery gas outflow. Therefore of that, some measure of vitality is squandering. Keeping in mind the end goal to beat this issue we are going for Rate and Power Control technique, by utilizing this we can utilize vitality in proficient way. What's more, this technique assumes a noteworthy part in future Wireless media transmission innovation. In present situation we are utilizing 3GPP and Long Term Evaluation in cell correspondence these advancements gives fast information, huge ghostly effectiveness and so on we can utilize vitality in productive way by utilizing these technologies called

- a) MIMO
- b) OFDMA
- c) RB
- d) Sub channel assignment.

In the above process each user may allocate to the RB (Resource Block) by resource allocation algorithm, the RB provides good QOS (Quality of Service) and efficient use of energy. Energy efficient algorithm for allocating sub carrier to the user shows water filling packet scheduling algorithm and shows that Resource Blocks is allocated to the users by resource scheduling.

The asset distribution issue needs M2M and H2H client's vitality proficient asset portion in uplink LTE

arranges under measurable QoS provisioning the double issue. This paper gives Downlink transmission and backings the accompanying

- a) Real Time and
- b) Non Real Time

The Rate and Power Control strategy may give more inclination to ongoing clients since they utilize the innovation consistently, where as non-continuous clients utilize the innovation in some particular circumstances. So this technique gives more power when number of client's increments. What's more, this is the effective technique to utilize control in a productive way in present situation..

### 2. BACKGROUND

#### A. Radio Resource Allocation

In radio resource allocation previously, we are used TDMA, FDMA techniques. In TDMA time is divided into frames then frames are divided into subframes. 10ms frames are divided as ten 1ms sub-frames. Then these sub frames divided into time slots. Each subframe is divided into two slots each slot will contain 0.5ms and every slot will contain 7 OFDM symbols with normal cyclic prefix. In FDMA each channel is divided into sub channels as in frequency. One sub channel will contain 180 kHz and every sub channel will contain 12 consecutive and equally spaced OFDM sub-carriers. Resource block (RB) will obtain by performing intersection between the sub channels of frequency domain and time domain.



## B. Green Wireless Communication:

Green wireless communication technology is working on efficient energy utilization of future communication networks.

There are four main research topics in this domain they are:

- Network architectures.
- Radio resource management (adaptive)
- Interference management.
- Energy consumption models metrics.

## C. OFDMA

Orthogonal frequency division multiple access (OFDMA) is a multi-access version of the orthogonal frequency division multiplexing (OFDM). The main difference between OFDM and OFDMA is in OFDM only single user will use the data, but in OFDMA multiple users will use the data. In OFDMA total bandwidth is divided into sub channels with sub-carriers and each sub-carrier are modulated with a lower data rate. At a time these lower data rate streams will transmit through the sub-carriers, then we can achieve the high speed of data transmission

OFDMA will use the advantages of OFDM technique, i.e. Multipath mitigation and interference cancelation and combat against channel fading effect, in OFDMA there will a large number of sub-carriers. Those sub-carriers should transform carefully in a scheduled manner. According to the channel conditions or user's demands transmission can be done so dynamic frequency allocation is achieved in OFDMA.

## 3. PROPOSED METHOD

### A. Admission Control Mechanism

In this implementation we are going to consider a very high number of users. As users are suddenly increasing and decreasing, the fixed resource allocation algorithm will provide the data in continuous fashion, so there is very high data loss. That data loss is nothing but power and energy loss is very high.

As session incoming to the system we are separating them as real time users and nonreal time users. RT users are using data continuously and very high data requirement is there but for nonreal time users less data requirement is there. As shown in Figure-1.

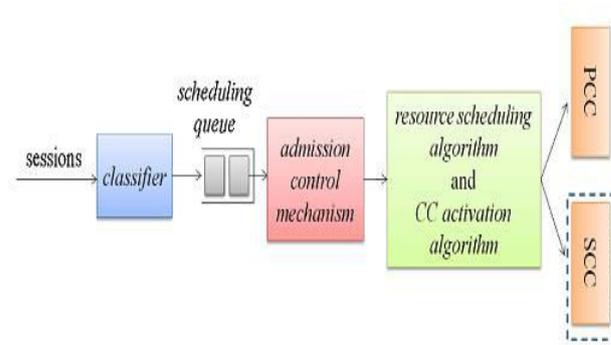


Figure-1. Admission Control Mechanism.

### B. Affirmation Control Mechanism

By using this mechanism we are going to check the requirements of the data rate. We know the basic formula of capacity of channel. Below one data rate formula is there which is derived from it. Based on  $r_{m,j,n}^{(k)}$  can be given as

$$r_{m,j,n}^{(k)} = \beta \log_2 \left( 1 + \frac{K P_{m,j}^{(k)} |H_{j,n}^{(k)}|}{\beta N_0} \right) \quad (1)$$

Above the sub channel noise  $N_0$  is the commotion power unearthly thickness,  $j$  and client session  $n$  on CC  $k$ , and bandwidth available  $\beta = 12 \cdot 15000$  is the data transmission in Hz for a RB, one RB is having 12 subcarriers what's more, each subcarrier is characterized to have 15 000 Hz,  $K = -1.5 \log(5B E R)$ , where BER is the wanted (steady) piece blunder rate, and  $P_{m,j}^{(k)}$  is the required transmission energy to accomplish  $r_{m,j,n}^{(k)}$  under the plan structure in (1). In light of (1), the transmission force of  $(m, j)_{RB}$  on CC  $k$  can be given as

$$P_{m,j}^{(k)} = \frac{\beta N_0}{K |H_{j,n}^{(k)}|} \left( 2^{\frac{r_{m,j,n}^{(k)}}{\beta}} - 1 \right) \quad (2)$$

From the above formula for power we can easily calculate the energy requirement in CCk carrier,  $E_k$  can be calculated as

$$E_k = \frac{t_{sub\_frame}}{2} \sum_{(m,j)_{RB} \in \Omega_k} P_{m,j}^{(k)} \quad (3)$$

Where  $t_{sub\_frame}$  length of each subframe,  $\Omega_k$  is the arrangement of all RBs in each subframe of CC  $k$ .

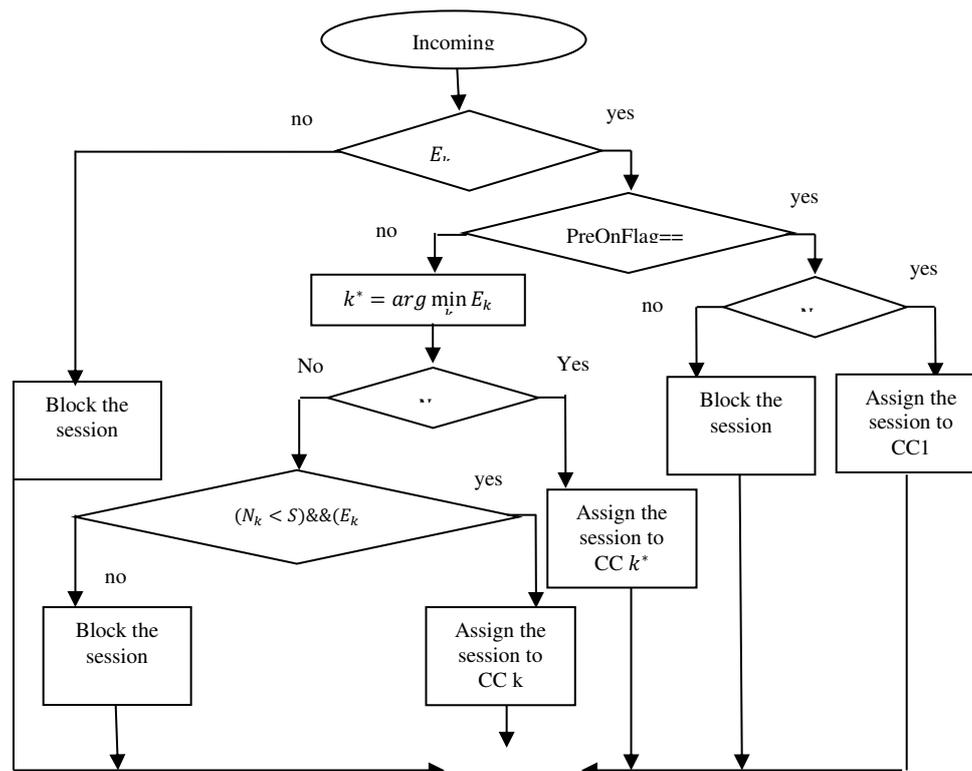


Figure-2. Flow chart of the admission control mechanism.

Below control mechanism algorithm is there which shows that if power requirement is very high at that time how we can access to the SCC. We are using 'preonflag' to know the status of the SCC. That is either SCC is available or not.

If In PCC available power is utilized then we have to go for SCC to access more users. Those who require again less energy is checked by using  $\arg \min E_k$  condition. If  $N_1 < S$ , where  $N_k$  speaks to the number of client sessions in the framework on CC k, then we can use again PCC. Instead of SCC, we can use PCC.

In the other case, if  $\text{PreOnFlag}==1$ , CC  $k^*$  that has the base  $E_k$  will be picked. Taking after that, the instrument will check whether  $N_{(k^*)} < S$ . In case yes, CC  $k^*$  will be rolled out to the new session; something else, the instrument will advance check whether  $N_k < S$  besides,  $E_k < E_{\max}$  to make sense of whether the new session can get to CC k. See that the operation and check of the framework is executed toward the begin of each subframe.

### C. Objective of the Novel Energy-Saving Transmission

Scheme in sight of the thought of framework demonstrate, the combination vitality utilization in every subframe at the SB handsets is pointed to be decreased, whereas maintaining the block probability of all shopper sessions, the bottom needed data rates for each reasonably purchasers, and also the reasonableness among all purchasers in associate degree satisfactory level. To profitably and adequately accomplish the higher than objective, a completely unique vitality economical arrange, which includes associate degree quality booking

calculation in Section III and a CC initiation calculation in Section IV, is projected

### D. Resource Scheduling Algorithm

The introduced plus booking calculation incorporates 2 calculations that area unit severally planned for the operation as takes after:

1) Vitality versatile rate management calculation (EARCA) additionally,

2) Radio resource allocation algorithm (RRAA).

The RRAA calculation is more isolated into 2 sub algorithms named

B.1) knowledge transfer capability task calculation (BAA) and

B.2) plus piece designation calculation (RBAA), separately.

EARCA is meant to powerfully alter the NRT client's assigned limit visible of his/her means misfortune criticism and also the current utilized vitality. When the NRT client's data rate is about, BAA decides what range of RBs need to be parceled out to every shopper session, whereas RBAA is used to encourage decide the set of RBs for those sessions.

### E. Radio Resource Allocation Algorithm (RRAA)

RRAA is made public on the premise of the plus allotment approach used, for its process many-sided nature advantage. Pseudo codes for purpose by point operation are composed in Figures 5 and 6, separately. In each selection age of every subframe, the BAA sub formula in Fig. five are going to be dead 1st. each single remote consumer can criticism their channel additions to the



baccalaureate in order that found the center price of square channel will increase may be computed as info contentions. Likewise, the amount of needed RBs for all the consumer sessions are going to be set to zero initially. when instatement, all the consumer sessions are going to be distributed one Rb to start with, to confirm least info rate conditions. Next, the remainder of the RBs are going to be assigned as indicated by the distribution metric. It plans to apportion the Rb to the consumer UN agency will best advantage in term of the vitality utilization diminish within the wake of obtaining the Rb, and therefore the amount of needed RBs for the selected consumer are going to be enclosed one when the allotment. when the execution of BAA, the RBAA subalgorithm in Fig. half-dozen can during this manner be dead.

```

If(( $E_k > \gamma E_{max}$ ) || ( $E_k < \rho E_{max}$ ))
if(( $E_k > \gamma E_{max}$ )&&(level < 2))
level=level+1;
else if (( $E_k < \gamma E_{max}$ )&&(level > 0))
level=level-1;
end
end
NRT users
Set their capacities according to the level ;
end
    
```

**Figure-3.** Pseudo code of EARCA.

In RBAA, channel picks up and the quantity of each client session' required RBs are utilized as info contentions. For every RB, the subalgorithm means to discover the client who has the biggest channel pick up among all the clients. In the wake of finding the client, check whether the quantity of the current allotted RBs of the client equivalents to the quantity of its required RBs. In the event that yes, set the channel increase of the client approach to 0, and discover another client whose channel increase is the biggest among every one of the clients till the while circle is over. Once the two sub algorithms are done in grouping, each client session's accessible RBs are resolved.

**F. Component Carrier Activation Algorithm**

The CC initiation calculation is to make a decision the helpful utilization of the SCC as indicated by the unsteady system activity burden to essentially moderate the first vitality utilization of the SB.

$\frac{1}{|H_{j,n}^{(k)}|}$ : the average squared channel gain across all j sub channels for user session n on CC k, which is expressed  $\frac{1}{|H_{j,n}^{(k)}|} = \frac{1}{j} \sum_{j=1}^j |H_{j,n}^{(k)}|$

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forall users in CCk
Allocate each user session 1 RB;
While ( $\sum_{n=1}^{N_k} m_n^{(k)} < 2j$ )
For n=1:  $N_k$ 
Calculate the allocation metric expressed as
    
```

$$G_n^{(k)} = \frac{\beta N_0}{K |H_{j,n}^{(k)}|} \left[ (m_n^{(k)} + 1) \cdot 2^{\frac{r_n^{(k)}}{\beta(m_n^{(k)} + 1)}} - m_n^{(k)} \cdot 2^{\frac{r_n^{(k)}}{\beta m_n^{(k)}}} \right];$$

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End
n* = arg min G_n^{(k)};
m_{n*}^{(k)} = m_{n*}^{(k)} + 1;
end
    
```

**Figure-4.** Pseudo code of BAA.

$S_n^{(k)}$ : the set of current allocated RBs for user session n on CC K/

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For each (m, j)_{RB}
n* = arg max_n |H_{j,n}^{(k)}|^2;
While (|S_n^{(k)}| = m_{n*}^{(k)})
|H_{j,n}^{(k)}|^2 = 0;
n* = arg max_n |H_{j,n}^{(k)}|^2;
End
S_{n*}^{(k)} = S_{n*}^{(k)} union {(m, j)_{RB*}}
End
    
```

**Figure-5.** Pseudo code of RBAA.



4. RESULTS

A. Proposed Method

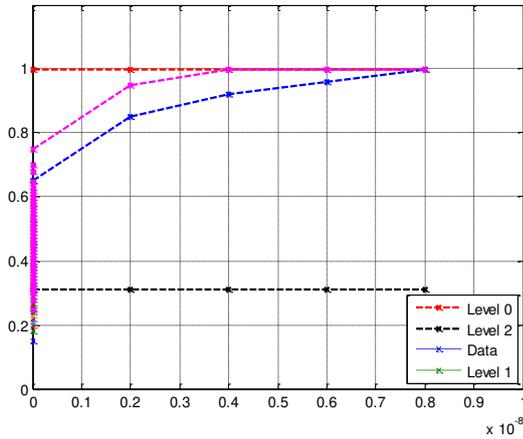


Figure-6. Illustration of the reduction ratio as a function of the channel gain being used to determine the allocating capacity for the NRT users.

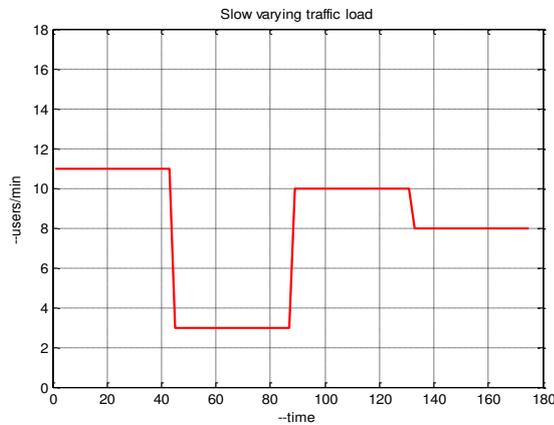


Figure-7. Slow time-varying traffic loads versus time.

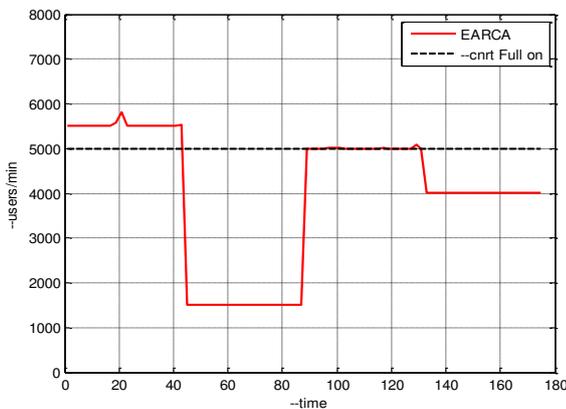


Figure-8. Comparison of the energy consumption between the proposed scheme with EARCA, Level 2, and the comparison scheme.

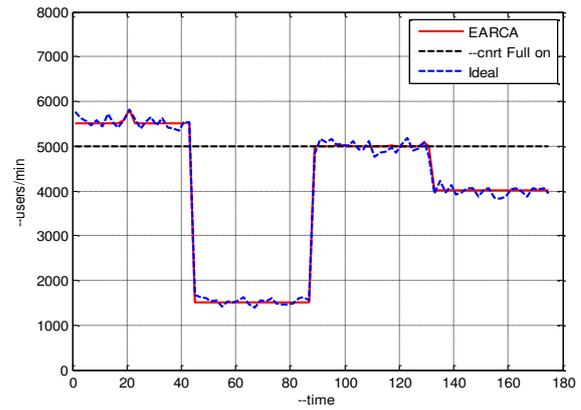


Figure-9. Comparison of the energy consumption between the proposed scheme with EARCA, Level 0, and the comparison scheme.

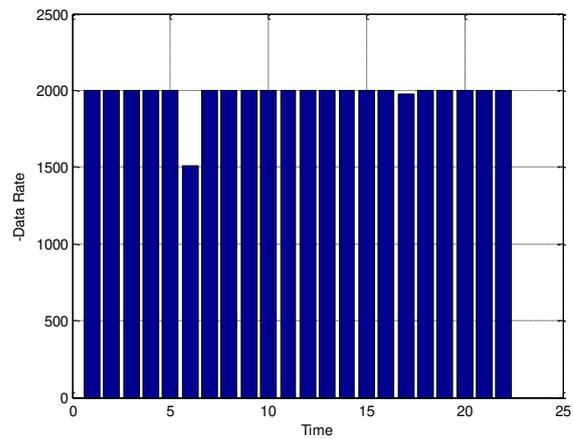


Figure-10. NRT users' average data rate every 10 minutes of the proposed scheme with EARCA.

B. SUI Channel

SUI channel is nothing but fixed path that is used for transmission with efficient manner. We are going to consider some parameters like Antenna diversity, Antenna correlation.

5. CONCLUSIONS

In this paper we tend to build up an OFDMA based for the most part multicarrier organize frameworks with the help of SUI channel model, was with achievement anticipated. We tend to are allotting asset squares adaptively to deal with the speed and power as shrewd QoS and furthermore the reasonableness at consistent time. By the work of SCC, we tend to staying away from unnecessary vitality utilization for the precarious movement stack. With the help of reenactments we tend to find out that vitality is speedily used giving sublime topic to utilize multi-cc cell framework at Bachelor of Science, for the most part to evade the issues like carbon di-oxide discharge and expanding needs of the vitality cost. Additionally, with the help of SUI channel



we tend to are getting to be noticeably higher improved outcomes as contrast with AWGN channel.

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