LTE Based Mobile data Offloading through a Third-Party Wifi Access Point

Pankaj Kumar 1, Mohit Vats 2,
1M.Tech Scholar, GyanVihar University, Jaipur, Rajasthan, India
2 Assistant Professor, Gyan Vihar University, Jaipur, Rajasthan, India

Abstract— To deal in company of the issue of rising transference of data in networks of cellular technology because of minimal need & transference rate, Wifi offloading is considered to be the best approach. Here the issue of offloading of packed data via access point of third party Wifi is discussed. This issue is manipulated in terms of its utilization by considering it as pay per go model as per the assumption of operators. There are mainly outworks on this model: 1) SIC termed as successive interference maycellation that may be availed at both AP & BS. 2) SIC which may’t be availed at either AP or BS. 3) SIC that may be availed at BS only. For the first schema, it is described as its solution in company of the problem of relaxation & more the optimization scheme when the number of users got a raise. For 2nd schema it is noticed that the association of one on one is the best approach in company of high approximation that means one user is linked to AP while other to BS. For the 3rd schema, only one user may link to AP while other links to BS. It is proved that the utilization by operators is maximized by SIC, LTE decoders by putting these scenarios in contrast. In order to eliminate the load of computations of BS,

To relieve the computational burden of the BS, we propose a threshold-based distributed data offloading scheme by LTE algorithm. We show that the proposed distributed scheme performs well if the threshold is properly chosen.

Keywords—WiFi off-load, utility maximization, user association, integer programming, Schur convex.

I. INTRODUCTION

THE quick expansion of mobile phones & mobile Internet services in recent years has produced a lot of data custom in surplus of the cellular network [1]. The unparalleled explosion of mobile data traffic has led to congested cellular networks. For examplar, in metro areas & during peak hours, most 3G networks are filled to capacity [2]. Mobile users in clogged areas will have to know-how tainted cellular military, such as low data transmission rate & low quality phone calls.

A uncomplicated move toward address above problems to upgrade the cellular network to additional advanced 4Network. a different come up to is to organize further bottom stations(BSs) in company of smaller cell size such as femtocells [3]. Nevertheless, these approach bring upon yourself augment in infrastructure charge. A added money-making come within reach of is to relieve of some of the mobile traffic to WiFi networks, which is over and over again referred to as WiFi off-load. It has a few reward: (1) No consumer gear improvement is requisite. This is for the reason that nearly all of the mobile data services are shaped by smart phones which previously have integral WiFi modules. (2) No licensed spectrum is essential. WiFi devices activate in unlicensed & world-unified 2.4 GHz & 5 GHz b&c. (3) High data rates. IEEE 802.11n WiFi may bring data charge as elevated as 600 Mbps & IEEE 802.11ac may deliver up to 6.933 Gbps [4], which is a great deal sooner than 3G. (iv). Low infrastructure price. WiFi routers are a large amount cheaper than the cellular BSs.

For the abovementioned reasons, WiFi off-load become sizzling investigate topic & has paying attention the consideration of many researchers all above the humankind [5]–[19]. Possibility of augmenting 3G using WiFi was investigated in [5]. Presentation of 3G mobile data offloading from side to side WiFi networks for metropolitan areas was calculated in [6]. The statistics of APs required for WiFi offloading in large metropolitan area was willful in [7].

unusual approach to put into operation WiFi offloading & to recover the presentation of WiFi offloading were Investigated in [8]–[13].

Load balancing & consumer involvement difficulty for offloading in heterogeneous networks in company of cellular networks & small cells are probed in [14]–[17]. In [14], the authors probed the outage probability & erotic rate when a supple cell organization scheme is adopted. In [15], the authors urbanized a universal & obedient model for data offloading in heterogeneous networks in company of different tiers of APs. In [16], authors probed the down link client association problem meant for load balancing inside a heterogeneous cellular networks. In [17], the authors probed the data offloading schemes for load united networks, & showed that best possible loading is well-mannered when relative fairness is measured. Current works [18]–[21] probed the network economics of data offloading from beginning to end WiFi APs by means of game assumption [22].

II. PROBLEM STATEMENT

Speedy expansion of mobile phones & mobile Internet services in topical years has produced a lot of data usage larger than cellular network [1]. Extraordinary detonation of mobile data traffic has led to teeming cellular networks. For case in point, in metro areas & for the duration of peak hours, a good number 3G networks are swarming [2]. Mobile users in stuffed areas will have to understanding dishonored cellular services, such as low data transmission rate & low superiority phone calls. A undemanding loom to take in hand on top of trouble is to improve the cellular network to the additional highly developed 4G network. A different come within reach of is to position supplementary base stations (BSs) in company of smaller cell size such as femtocells [3]. On the other hand, these looms acquire amplify in infrastructure cost. A supplementary lucrative come up to is to relieve of some of mobile traffic to WiFi networks, which is habitually referred to as WiFi relieving. It has a a small number of recompense: (1) No consumer gear improvement is requisite. This is for the
reason that nearly all of the mobile data services are shaped by smart phones which previously have integral WiFi modules. (2) No licensed spectrum is essential. WiFi devices activate in unlicensed & world-unified 2.4 GHz & 5 GHz b&c. (3) High data rates. IEEE 802.11n WiFi may bring data charge as elevated as 600 Mbps & IEEE 802.11ac may deliver up to 6.933 Gbps [4], which is to a great extent more rapidly than 3G. (iv). Near to the ground infrastructure rate. TheWiFi routers are a great deal cheaper than cellular BSs. For aforesaid motives, WiFi offloading be converted into a sizzling research topic & has fascinated attention of many researchers all over the world [5]–[19]. Possibility of supplement 3G using WiFi was probed in [5]. Recital of 3G mobile data offloading from first to last WiFi networks for metropolitan areas was premeditated in [6]. Figures of APs wanted for WiFi offloading in large metropolitan area were deliberate in [7]. Poles apart looms to implement WiFi offloading & to perk up the concert of WiFi offloading were probed in [8]–[13]. The load-balancing & customer connection crisis for offloading in heterogeneous networks in company of cellular networks & small cells are probed in [14]–[17]. In [14], the authors probed outage chance & erotic rate when a stretchy cell alliance scheme is espoused. In [15], the authors urbanized a all-purpose & polite model for data offloading in heterogeneous networks in company of different tiers of APs. In [16], the authors probed the downlink client alliance predicament for load balancing in a heterogeneous cellular networks. In [17], authors probed data offloading schemes for load united networks, & showed that optimal loading is well-mannered when comparative fairness is well thought-out. Modern works [18]–[21] probed network economics of data offloading through WiFi APs by means of game supposition [22]. Diverse from on top of work, in this paper, we regard as scenario that there is a third-party WiFi AP on condition that data offloading service in company of a usage-based incriminate policy. We probe data offloading quandary all the way through such a third-party WiFi AP for a cellular mobile communication system. As of business perspective, the cellular operator aspires to make the most of its proceeds. In consequence, in this paper, we probe the data offloading hitch from economic peak of outlook. We put together dilemma as a effectiveness maximization setback & receive matching data offloading schemes for cellular operator [12].

In fastidious, we think about three scenarios, that is to say, SIC available at in cooperation BS & the AP, SIC accessible at barely the BS, & SIC to be had at neither the BS nor the AP. We learning singular helpfulness functions & suggest dissimilar data offloading schemes. The major input & outcome of this paper are shortening as follows.

- SIC existing at neither the BS nor the AP: For this case, we meticulous provide evidence that when the digit of users is huge, most favorable explanation is One-One-Association, i.e., user in company of the best user-to-BS channel attach to the BS & that in company of the best user-to-AP channel attach to WiFi AP.

- SIC offered at simply the BS: For this case, we give you an idea about that when the amount of users is bulky, there is at a good number one user concerning to the WiFi AP, & all the additional users unite to the BS. A polynomial-time algorithm is urbanized to come across optimal offloading scheme.

- SIC is advantageous for cellular operator: We scrupulously show that SIC decoders are favorable for cellular operator in stipulations of maximizing its effectiveness.

- Dispersed data offloading scheme: We recommend a threshold-based disseminated data offloading scheme for case when SIC decoders are obtainable at in cooperation BS & the AP. We establish that planned circulated scheme may accomplish same presentation seeing that federal data offloading scheme just the once doorstep is appropriately selected. we mull over a cellular network in company of N users hand round by a base station (BS).We presuppose that there is a third-party WiFi access point (AP) in company of in the coverage area of the BS. The WiFi AP & the BS bring into play orthogonal frequencies. Accordingly, there is no inter-network intervention connecting WiFi & cellular network. To take full advantage of the network throughput & advance on the whole network routine, cellular operator may straight a quantity of of its users to be provided by the WiFi AP. Seeing as WiFi AP belongs to a third-party operator, data offloading through AP is thus not for free. Cellular operator has to remuneration AP operator an inducement while assurance an optimized utility [12].

In the base paper threshold-based distributed data offloading scheme algorithm apply but the utility of the operator is getting low for in company of SIC & in company ofout SIC for AP & BS.

![Fig. 1. System model.](http://www.ijritcc.org)
III. PROPOSED METHODOLOGY

LTE, an abbreviation for Long-Term Evolution, commonly marketed as 4G LTE, is a standard for wireless communication of high-speed data for mobile phones & data terminals. It is based on GSM/EDGE & UMTS/HSPA network technologies, mounting competence & velocity by means of a dissimilar radio interface jointly in company of core network enhancements. The standard is urbanized by the 3GPP (3rd Generation Partnership Project) & is individual in its discharge 8 document series, in company of minor enhancements explain in Release 9.

LTE is the natural promote path for carriers in company of in cooperation GSM/UMTS networks & CDMA2000 networks. The different LTE frequencies & bands used in dissimilar countries will denote that merely multi-band phones will be talented to make use of LTE in all countries where it is maintained.

Results are improving by apply LTE algorithm. LTE is gifted to get better the service of the operator, LTE, an abbreviation for Long-Term Evolution, Universally advertised as 4G LTE, is a average for wireless communication of speedy data for mobile phones & data terminals.

It is pedestal on GSM/EDGE & UMTS/HSPA network technologies, mounting competence & velocity by means of a dissimilar radio interface jointly in company of core network enhancements.

IV. RESULTS

Utility of the operator is increasing by apply LTE algorithm. In the base paper threshold-based distributed data offloading scheme algorithm apply which is showing in the blue color. As the image is showing that results are improving by apply LTE & utility of the operator get increase.

![Benefits of the SIC decoders](image)

V. CONCLUSION

We have probed mobile data offloading trouble through a third-party WiFi AP for a cellular mobile system. From cellular operator’s standpoint, we encompass formulated difficulty as a helpfulness maximization difficulty. By making an allowance for whether SIC decoders are to be had at the BS &/or the WiFi AP, poles apart cases are well thought-out. When the SIC decoders are existing at in cooperation BS & the WiFi AP, the effectiveness maximization difficulty may be resolved by taking into account its recreation setback. We enclose shown that proposed data offloading scheme is near most favorable when figure of users is hefty. We as glowing recommend a threshold-based disseminated data offloading scheme which may accomplish the same recital as centralized data offloading scheme if the threshold is correctly preferred. When the SIC decoders are not to be had at mutually BS & the WiFi AP, we have scrupulously proved that best possible way out is One-One-Association, i.e., single user connects to the BS & the other user unites to the WiFi AP. When the SIC decoder is barely offered at the BS, we encompass shown that there is at the majority one user concerning to WiFi AP, & all the other users attach to the BS. We also have austerely proved that SIC decoders are of assistance for cellular operator in stipulations of maximizing its effectiveness.

REFERENCES

[12] Xin Kang, Member, IEEE, Yeow-Khiang Chia, Member, IEEE, Sumei Sun, Senior Member, IEEE, & Hon Fah Chong, Member, IEEE, “Mobile Data Offloading Through A Third-Party WiFi Access Point: An Operator’s Perspective”