Offloading Mechanism in Heterogeneous Networks

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Abstract -- For mobile operator it is critical task to handle increasing data traffic .To low down burden on cellular network we can use offloading mechanism ,in this paper we introduce new idea of data offloading technique and classification on bases of services and architecture

I. INTRODUCTION

Mobile data traffic increasing now years and smart phones are main reasons, high data application such as video, audio and cloud based services more common now days. Cisco's analysis suggested that in world wide data traffic will increase 18 times between 2011 - 2018, which is much faster [1].

In future 66% of data traffic will be related video data, now data access methods we have won't support such high scale application, because of this cellular network suffer overload burden. To support growth we need high investment in Radio access network (RAN) and infrastructure, which will not get financial profitable output.
Mobile operator can use small portion of radio spectrum, which is costly because of directive .User has same source of bandwidth, high data traffic degraded performance and Quality of service (QoS). In peak duration crowded city user experience long delay, low output, congestion in network. [2].

Above issue bring-up interest in another method to lower down load on cellular network, throttling speed and capping data usage are technique for solving contingency developed by mobile operator, but it had adverse effect [4]. So new technique we came up with *MOBILE DATA OFFLOADING*.A Simple way to use unused bandwidth in different wireless technology. It is addition Service to routing data which initially routed from cellular network.

Offloading can be apply to any network, ,mostly used in cellular network which is more beneficial with this technique we can decrease load on network infrastructure ,route data to additional wireless technology, gives number of advantages –increase output ,increase coverage area , improve energy efficiency , decrease delivery time these For this facility we have to do financial investment and fix the number of problem related to infrastructure co-ordination, mobility of user, cost, and smooth service.

In figure we shown two approach of offloading in fi 1(b) with WIFI and compare with conventional way 1(a) in hot spot coverage are user is placed it act as small network alternative to cellular network which gives better connectivity and higher output. It has issues with mobility, hot spot point act as access point to build network with access point cost is very low compare with cellular network.

Because of smart phone we can have terminal to terminal (T2T) network, which is direct communication between users without network infrastructure in fig 1(c).As depict in figure two type of offloading 1) Access point(AP) 2)Terminal to terminal(T2T) based on architecture , but categories are also depend on services i.e 1)Delayed offloading 2)Non-Delayed offloading So, combining these we have total four categories and many subtypes.
Timeline content handle is different between delayed off loading and Non delayed offloading, Non Delayed don't have additional delay of small amount present delayed offloading.

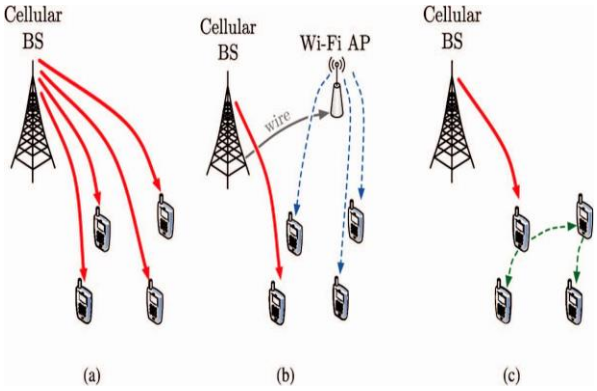
II. NON DELAYED OFFLOADING

Each data packet has hard deadline to meet in delivery aspect due to service condition, delay is not allowed due to quality service. Audio and Video data requirement can't have latency because there on time application, we have to consider leady of 50msec for voice connection and 1sec for video data, this makes non-delay unfeasible. Moving user is big constrain for that we have work on transparent handover and

interoperability between offloading technique and cellular network

III. DELAYED OFFLOADING

In this technique data traffic purposely delayed to have satisfactory condition, traffic has two type 1) traffic with Loose QoS:- Individual packet can be delay but all data contain must reach within time.
2) Truly delay tolerance traffic: - This traffic guarantees no delay this offloading is more concern about mobility of user we can implement it practically.
AP Based:-Ap based offloading technique user itself operates, this need no changes in network structure, it has some problem also like lack of mobility and continuity in service. Service Provider want tight connection between cellular network and another access network, these form two possible network with cellular and WIFI. Loose coupling and tight coupling, Loose coupling-independent and indirectly integrated and tight coupling-share common structure and many function.



AP Deployment :-By fixing AP's we can reduce congestion in network area, this time interesting offloading mechanism, traffic will go through different channel i.e AP's , by fixing AP's increase in quality service and output, but decrees in outrage. So, by deploying 10 AP per kilometer unit area can increase output by 300% and 15% decrease in outrage But deploying AP is short duration solution this can fix 70% of data traffic route through AP's ,nevertheless many AP can create mutual Interferences and also have some similarities between them which will make problem for deciding which AP will route which data traffic flow, this issue can be solved by mechanism called access network discovery and selection function(ANDSF).

3GPP Standardization:- 3rd Generation partnership project (3GPP) use offloading technique to handle overload issue in cellular network. Suggest ANDSF mechanism to switching between different accesses technologies.
ANDSF- structure for communicating devices, network selection and traffic routing this also suggest 3 different offloading mechanism Local IP access (LIPA), selection IP traffic offload (SIPTO), IP flow mobility (IFOM)
LIPO-for femtocell and can pass data in same region without routing through cellular network
IFOM-RAN level offloading taking place, with 3GPP we can offload data in different ways in LTE network methods like
LIPO, ANDSF, IFOM, SIPTO has transparent handoff mechanism.

Transport protocols:- This protocol should provide smooth switching over different connection with multi access technology. When user is mobile then it is difficult to provide
Seamless service and Wi-Fi coverage with limited area. To provide correct size of data of each interference some model
Suggested the utility user, trading off between cost of connecting and output. SCTP (stream control transmission protocols) is scheduling logic for multiple IP address at each end user, the structure suggested in this transport protocols add
Throttling, stripping, in SCTP implemented. Because of that 60-80 % reduction in load of cellular network.
At time use of many access technology create some problem, to get more advantage of Non-delay offloading we have to develop communication stack which has support advanced property(e.g switching inter technology, data aggression)
If we upgrade standard protocols we can sort this challenges (i.e SCTP, MPTCP) average distribution of bandwidth between technologies, allow smooth handoff between different technologies.

IV. TERMINAL TO TERMINAL (T2T)

T2T offloading can substitute multitude wireless technology.T2T has two categories 1) solution dependent on another unlicensed band (like WIFI and Bluetooth) communication Technology. 2) License dependent path cellular band to T2T communication (in-band). This T2T is same band communication, with this we can take advantage of co-operative methods available at multiple interface. T2T give flexibility in network but add some mutual interference

Co-operative Data Distribution:- Proxy get data through cellular network and broadcast it on WIFI interface to other terminal with this we can save cost of network by 90 %. When keeping proper resource use. A new thing is evolved to cut battery depletion in the case of IM (Instant Messaging) service with this system we can download each video data packet through cellular network and share in short range links. These access have to co-ordinate with needy node to support cellular structure. One will act controller node find output on cellular link for other node co-ordination can have proper information sharing. Complexity cooperation data distribution is high, because connecting difference access technology, interference, transmission rates, scheduling, and energy efficiency.

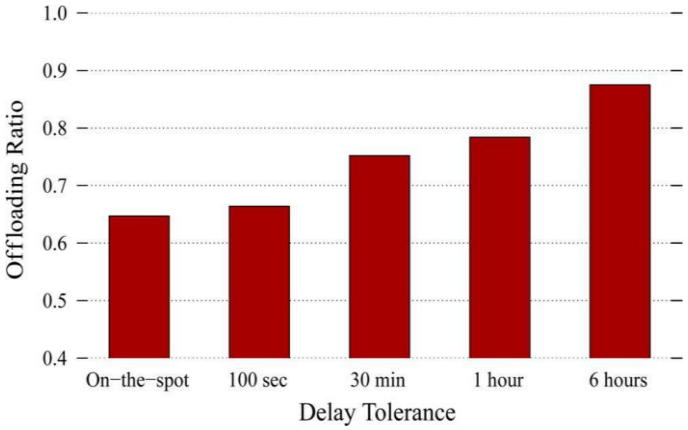
Device To Device capabilities Integration:- New evolution of 3GPP LTE standard suggest integrating direct in band communication capabilities that refer to Device to Device (D2D). This make possible of small range and cellular transmission give user varies direction freedom for transmission, hence we use this for load balancing purpose, D2D communication is proving ideal stage for data offloading for future technology, because it can get higher resource utilization by reusing spectrum of neighboring devices

Reliability increases for short range distance. This technology has some problem such as neighbor discovery, transmission scheduling, resource allocation and interface management when many cell made. Proper use of radio resource allocation help to reduce mutual interference between D2D communications.

By knowing user movement performance is devised. In this technology we can increase efficiency 50% which give benefit to large user in cell D2D share the resource with cellular transmission so it may have interference,D2D communication supervise resource utilization and quality service.

Prediction-Based Offloading: fixed AP's and help of geo localize we can get information of node mobility to improve offloading process predictor provide information to coordinator how many AP's node came across route, when then change AP's and for long they remain with that AP Now algorithm will try to reduce latency to offload data to WIFI and ensure data transfer before time.

When moving user need data then offloading coordinator replies with list AP's where user can get needed data .Offloading coordinator get information about moving user by predicting neighboring AP's by the position information uploaded by user through control channel. This algorithm determine when change in transmission take place by adapting offloading process, main function of work is to increase efficiency of energy of delayed transmission because Wi-Fi has good efficiency than cellular network. Key requirement of this type offloading is future capacity prediction.



Feasibility and access point deployment:-

In this type of offloading we get feasibility and offloading of AP-Based offloading performing the increasing delay tolerance of data improve the ratio of offloading traffic

Average completion time taken to offloading is always much less than max deadline, with large data, delay in transmission may has fast completing time than not to delay, because of this Wi-Fi has high data rate compare to cellular network. Here time factor matter a

lot as increase in delay tolerance lead to increase data offloading fraction.

V. CONCLUSION

With low cost mobile data offloading can decrease traffic on cellular network also give benefit to user with high quality network Also low down burden on RAN this method can be alternative mobile network access method with technology we can have tight integration between cellular RAN and complementary access network allow offloading concurrently.

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