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Research paper

A prediction scheme of mobility of cognitive femtocells LTE-A / LTE-UE under different speed scenarios

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Abstract

Cognitive Femtocells have been standardized suitably to the technical framing of the Fourth cohort compact project to place them inside and outside the cell. Cognitive femtocells expand the coverage area and meet the future demands of higher data rates. However, as a result of the massive deployment of cognitive femtocells, users experience additional delay and unnecessary deliveries. The different hand off mechanisms are 1. Hard handover (break before make) 2. Smooth or soft handover (*make-before-break*). This can seriously affect the quality of service (QoS) of jam sensitive applications, such as Voice over long-term evolution (VoLTE). The 4GPP LTE-A / LTE-UE wireless networks aim to provide uninterrupted movement and rapid transfer pillar for (Real Time) RT and non-RT application services under the giant vigour. The prediction of mobility is an effective technique to identify a domestic NodeB (eNB / HeNB) evolved in the future and improve the overall service quality of the network and satisfy the end user experience. The different hand over mechanisms are, the first sense of a difficult delivery or transfer is one in which an breathe link should be penetrate ahead a unused one is created. The second new 3G technologies use CDMA where it is possible to have adjoining cells at the same frequency and this opens the odds of boast a transfer or transfer from where it is not required to repair the connection. This is called soft transfer, and is defined as a handover in which a not used tie-in is established before the used one is released. The third type of delivery is called smoother delivery or transfer. In this case, a pristine signal is added or deleted from the spry signal group. It can also happen when a signal is replaced by a burly signal from another sector under the base station. This type of transfer is available within UMTS and CDMA2000. "The cognitive femtocell will do in the delivery mechanism is that it will detect the new channel to transmit the data. With this we can avoid the delivery handover mechanism". This study investigates the role of mobility prediction in reducing the end-to-end delay of VoLTE and the delay of handover under different user equipment (UE) speeds in mixed femtocell and macrocell environments. We propose a mobility based forecasting scheme based on the user path and measurements of the received signal reference signal and the quality reference signal (RSRP / RSRQ) with mixed RT traffic and not RT and then estimated using a network model new. The survey analysis shows that the proposed scheme will reduce the delivery delay by 35% to keep VoLTE at the end of the delay.

Keywords: *Cognitive Femtocell, Handoff/ Handover, LTE, LTE-A, LTE_UE, Femtocell, Macrocell, VoLTE..*

1. Introduction

In mobile telecommunications, handover or transfer refers to the process of transferring a continuous call or data session from a mainstream channel to another channel. When a cellular node is moving from a base station network to another base network area then the call can be unlocked to avoid this we have the delivery mechanism. In space station communications is the operation of carry the responsibility of space stage control from one ground stage to another without dropping or disturbance of the service. In our EU work moving from microcell to femto cell, then the distribution of channels that will be considered this is the delivery between the hybrid networks.The hand over or hand off are two categories 1. Soft hand over 2. Hard hand over.

The soft hand over: Occurs when diversity gains are the increase in the ratio of the wave to tampering due to part of medley schemes or mega much the hauling talent can be compressed when the medley scheme is presented on the outside loss of exploit. Profitability of medley is usually expressed in decibel, and now and again as a preach ratio. An ideal is the profit of the soft tide. For the selection that combines the N slots earned and the stable slot is tabbed. When slots n is independent and Rayleigh is distributed, the expected profit of diversity is shown to be $\sum_{l=1}^{n} 1/l$, expressed as the power ratio.

Mild submission over submission is one in which the medium in the mail unit is stored and used for a while in parallel with the slot in the purpose unit. The scenario, the link to the object is placed previously the mail link breaks down, so this handover is called "make-before-break". The layoff, during which both links are used in pale, will do short or solid. Due to this cause of soft hand is recognized by communication technical persons as a state of active in usage of slot rather than a short event. Soft delivery may prove the use of links in more than two locations: three, four or more cellular connections can be taken care by a phone at the same slots. When a usage of channel for communication is in a soft state, the signal of the best of all used available free channels can be used for the connection at a particulate point or all the slots can be grouped to produce a clearer copy of the signal. The latter is more advantageous, and when such a combination is done in the given time both in the down slot available or used (transmitting from source to Base station link) and in the back slot which is spectrum range (back link), the appearance is called milder. Smooth deliveries are feasible

when the slots involved in shipments have a one frequency location under Base Transceiver station site.

Hard hand over: Hard hand over is going to happen when the source target cell is engaged then frequency range in source location is released. So the link to the source is broken or 'how' is the link to the target - so such appearances are also known as break-before-make. Difficult shipments should be immediate to minimize call completion. A difficult delivery is considered by communication technical persons as an occasion or situation during the process of communication. This needs less processing from the service network. When the portable phone is among the mail office, then the portable phone can pass to any of the main office, so the main office jumps to the going back and feature connection. This leads to the 'ting-longing'.

For give up in telecommunication there are many different reasons: [1] when the mobile user movable device is shifting from one coverage area in which the call is established to another cell area due to mobility reason the call may be disconnected. Without disconnecting the call if call to be maintained then handoff should be performed and available thing or a just raised connection from a moveable device situated in an area covered by another group off devices is moved to this location to provide a certain amount of power to the first location of same group for other users who can only connect to cells outside of the CDMA communication network if the slot which for communication used by the telephone interferes another device that uses the same slots in another group, the communication between the source and destination is transferred to another slot used in the same area of communication or another slot of frequency in another cell, so if the user behavior changes, while avoiding interruption to the non-CDMA networks, when a person is in a vehicle with a call done through mobile and he is in call talking with others under a large umbrella cell type then handoff occurrence threshold is less. But for same case under micro cell the handoff chance is more to do this the call to break and then new call to be made i.e. break before make. On CDMA-networks to minimize disruption to a nearby less scale of area due to the "less distance-long" can be changed, even if the movable device further it is having a good allocation to the present location.

The simple call connection or call maintenance when the call is in live from its call enabled cell (called source Base Station area) to a target cell where to our user is going to move with mobile while call in active. In temporal communication, the person making call and the person received the call ranges can be used from 1+1 of opposite range sites or from the same cell site (to the next case, 1+1 area of signals are frequently used to as 1+1 zone for this location locus). Such an area in which the device done a call and device received the call of 1+1 locations (to the point they are in the same area of location) is called an intercellular transfer. The benefit of the within home location area blocking is to keep the particular slot given to the user to communicate when the main station person leaves the space covered by the stem cells and enter the target cell area [1].

A special thing is in handoff is that the source and the target are one i.e. the target location and present location of mobile device are in same cell area. The cell coverage area is not changed so that the transfer is named same type of -cellular transfer. The purpose of same type-cellular delivery is to modify a channel will gradually grow faint and disappear.

Change of movable device from one location to another location is secret based on the movable characteristics used. Maximum of movable classifications we will get as 3 types:

1. Organization controlled maintain the channel connection
2. Movable device support maintain the channel connection
3. Movable device restrained maintain the channel connection

The network controlled hand over is the phenomena where the movable device changes place from one cell zone to next or other cell zone then hand over will occur to overcome that hand over we will use the network controlled handover, the mechanisms used are to perform this are Movable Robust Minimisation (MRM).MRM is the new technique in LTE communication to optimal from feasible solutions handover performance by 3rd generation partnership project. Based on the cell load also the handover may occur [2]. In GSM cellular network the movable device (UE) support or helps the cellular central station to transfer a call to another central station this is called the mobile assisted handoff (MAHO). Mobile switching centre will take care about the call information between the base transceiver stations.In this paper the section II in going to tell about the drawback of the present LTE technology in handoff between the macro cell and femtocell. The section III is going to tell about the proposed method tells about how handover is handled between the two different cells. Section IV about the conclusion.

2. Drawback of the present LTE technology in FEMTOCELL

The methodological earmark from the UMTS soft handover was the soft hand over is missed i.e. the connect- before-break is not there because the hard handover is used. If we want to connect before break the channels should be available to allocate, to arrange like that we are going to find the free channels available by using the cognitive radios (CR). The CR is going to find the channels which are free without affecting the primary user of the network in the cell. While the user is shifting from the macro cell to the femtocell (which is created to give the signal strength to entire home or office areas) the user should cross the 2 different cells so handover may occur. Without disturbing call the user should move from one cell to another. The cognitive radio which we keep in the femtocell will identify the free channel and it going to allocate to the mobile user who are going to get in to the femtocell. Here the important point is who will enter first in to the femtocell. This can be identified by using the UE device velocity.

The LTE is using the hard handover but the soft handover is not implemented in the LTE.

Soft handover concept

A small forward delivery is considered to be subtypes of submission routine in which radio communications are combined or withdrawn in such a way that a radio link is eternally established with the EU. The SET ACTICE is maintaining the all radio connections that are linked to the UE at a given period, the connections are 1 to 8. i.e. the links are in minimum it is one and at maximum it is 8 to the UE.

Spongy delivery is part of the WCDMA system which is usually similar to concepts like CDMA systems. In case of soft delivery, the cellular station is in a space that overlaps two locations belonging to dissimilar central stations. In second signals (from call received person to called person) received from different central stations are combined with the receiver of the EU missile. Uplinked rush signals from different central stations for a particular EU are compared according to RNC's framework and the best bidder is preferred to the next interconnection period.ie every 10, 20, 40 or 80 ms Fig [1].

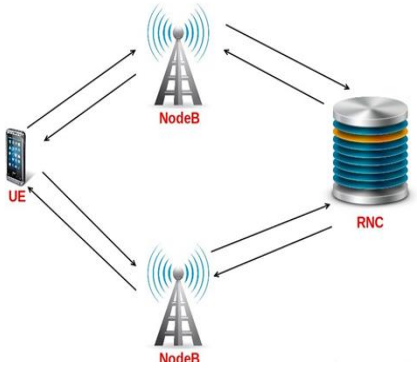

Fig.1 UMTS Soft Handover Building

If the EU connects to dedicated channels (DCH) then only the soft and gentle delivery is possible. The smooth delivery is not happening even the High Speed Downlink Shared Channels (HSDSCHS) are present to transmit the data. In communication with HSDPA there is a difficult delivery, which is the interruption before the connection. EU devices never connect to multiple smart signal connection at particular internal and when the EU comes not in the range on a specific range that has crashed the radio connection previously adding the best smart frequency channel connection.

The proviso for comfy distribution and what's away about LTE

Adjacent Cell Frequency Reuse

Smooth delivery is feasible in CDMA due to neighbouring frequency range can function at the smooth frequency as for some many periods they use the different reinforcement codes. The user can hear 1+1 contracting frequency areas decoding cells by call taken device to called signals once over. By using the amplifier code from each cell in each signal, this decoder allows the UE to communicate with source and destination cells during delivery, making the transmission soft. LTE uses OFDMA, which is a spectrum allocation method. This means that the European Union must be connected to other sub-syndicates when partners surrender between the cells, thereby eliminating the possibility of suppression. In fact, at the start of the EU LTE delivery process, the "compressed mode" must be entered, and the current cell will be heard from time to time and must be used for the remaining time. With state-of-the-art radio technology, this setting can be as fast as the case of better interruptions than previous generation GSM technologies, avoiding the urgency since smoother delivery.

Plane planning LTE has a plane structure, which facts there is no essential control of the joints such as BSC or RNC, in general call procedure the user call initiated from the UE then request will go to the nearest BSC. The BSC will work under the MSC. But in the flat planning method there is no central control. So there is no need to summarize the most using spectrum ranges you can depict for CDMA. One more cause why there is not required for LTE power restriction. Since its orthogonal resonant form, there is no personal intervention (like CDMA), so do not worry around getting the Rx variety and so the SHO may fall.

Orthogonality in LTE

The issue of cell waiting (it was at the core of smooth HO design in WCDMA) is not entirely relevant in LTE networks due to orthogonality in two called to calling and calling to called lines. Therefore easy delivery may drop from the LTE system.

The Universal Telecommunication System (UMTS) and 3GPP Long Term Evolution (LTE) devices are devices that end users use to communicate directly. It may be a mobile phone, a laptop with broadband adapter, broadband or other devices connected to the B / eNodeB base station as specified in the ETSI125 / 136 and 3GPP 25/36 specifications. With the novable device control station (MS) in GSM, the smart frequency interface between UE and node B is called UU. The smart spectrum range available interface between UE and eNodeB is called LTE-UU.

3. Proposed Method

The cause of the submission to the classic mechanism depends on the time of the EU measurement report and the delay in submitting the measurement report. The A3 measurement ratio caused by the EU laterally build up on 1+1 sarroundings for [3]:
1. The capacity obtained from the reference signal (RSRP) of the target cell I of the EU j is greater than the RSRP cell served measured by k.

RSRP (j, k) -RSRP (I, k)> compensated (I, j)

2. Status 1 remnant satisfied values at the time of given TTT's time.
HO compiled data having the trained data type as steps:
- intelligence on X2 between the actual thing without trained set and the final set of information NBU (preparation HO);
- Submission of RR Command HO message from source cells to the EU;
Using odd random access and sending an HO finalize the RRC trained data to the final range of frequency.
To the standard things every method fallows MRO group of steps based on the good delivery mechanism, HO free slot are feasible from that we will get required thing by adjusting the activation time of the EU measurement ratio by adjusting HO compensation, TTT or filter coefficient K.

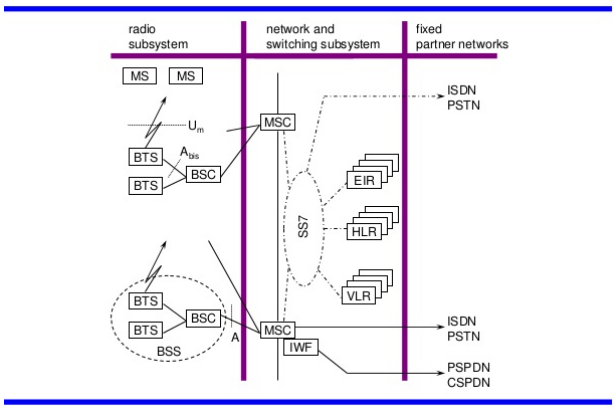

Fig 2. GSM System architecture

The classic mechanism is finding the distance of the mobile device to the edge of the cell covered but it is not concentrating on the velocity of the mobile device moving from macrocell to femtocell. The below algorithm is going to consider the velocity of the mobile device**.**

Algorithm 1: Proposed method to the handoff in between the micro, macro and femtocell.

Inputs: RSS (**Receive Side Scaling)** the trained data set of lexemes of femtocells and range of frequency of UE.
First step: available UE is placed to the initial femtocell.

Solution steps to the problem:

(p.1): The Neighborhood List (NFL) will be updated by sensing the available femtocell behavior and the UE devices velocity. The sensing will be happened periodically.

(p.2): If the sensing period for given threshold time completed the trained data (TD) will be obtained.

(p.3): The devices speed is reviewed. High-speed users are submitted macro cells. In the case of minimum agility users, the femtocell with the respective reduce RSS is selected by CL as the target.

(p.4): Verify the NFL. If the NFL never include femtocell, the selected femtocell is the target; otherwise there will be a check on the difference between the RSS from the femtocell selected in the NFL and TD.

(p.5): If the RSS in the NFL is smaller than the TD, the selected femtocell cell is targeted. Otherwise, the selected femtocell will be deleted from the TD, and the other femtocell with the lowest RSS value will be selected. If no femtocells are targeted, the macrocell is selected.

(p.6) The RSS value is minimum then the particular femtocell will be selected and the channel to be used will be decided by the CR which is in the target femtocell which is in the list TD.

Output: Target femtocell channel to taken identified by the CR (cognitive Radio).

In Fig.2 the mobile call will be initiated from the user UE then Base Transceiver Station will give the channel to transmit the data by having information from Base Station Controller. The two cell information will be maintained in Mobile Switching Center (MSC). If any UE is moving from one cell to another cell then switching will be happened under the controller of MSC. The newly visited nodes to the cell will be maintained by the foreign location register. But while switching from one cell to another cell call may be disconnected, to maintain the call without any break the handoff will be used. The existing handoff methods will use the LTE mechanism with the hard hand off then connection will be happened as break before make. But make before make to be implemented to avoid the data lose. Our algorithm is going to give the channel allocation while switching from one cell to another based the cell size and the mobile device velocity.

4. Conclusion

In this paper, we have focused on the role of mobility prediction in admitting real-time traffic and transfer delay in LTE-A / LTE-UE femtocellular cognitive networks. The study briefly described UE measurement reports, mobility management and handover procedures in Femtocell home-based eNBs. The purpose of this document was mainly to reduce the end-to-end delay of VoLTE and the delay of handover during high mobility, which can seriously degrade the performance of the LTE system. In this work, we are telling that the free channels available are not used by the primary user if they don't required, so those channels are used for the communication of newly entered movable devices in to the cell range area, this can be achieved. With this mechanism the cognitive femtocell is going to allocate the channel to the newly entered mobile device in to the Femtocell. With this the handover delay can be reduced.

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