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A Review of Cellular Networks Technology Channel Handoff TDMA and FDMA using Hybrid Scheme

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Abstract - Cellular communication is a technology which mainly makes the mobile phones to communicate with each other. In Cellular communication the end user that is the mobile phone user doesn't stay at a particular place but moves from one place to another. Handoff is allot as handover. The channel change due to handoff may be through a time slot, codeword or combination of these for TDMA, FDMA and CDMA or a hybrid scheme. For cellular communication systems, mobility and limited radio coverage of a cell requires calls to be handed over from one base station system (BSS) to an another BSS.There are occurrences where a handoff is unsucceful.Lots of research was conducted regarding this in the late 80's main reason was found out. Because frequencies cannot be reused in adjacent cells, when a user moves from one cell to another, a new frequency must be allocated for the call. If a user moves into a cell when all available channels are in use, the user's call must be terminated. In this paper the inter technology handovers where a calls connection is transferred from one access technology to another GSM/UMTS handoff to Wi Fi and Vice versa.

Keywords - *Cellular communication, Wireless networks, Sensor networks, MAHO*

1. Introduction

In telecommunications there may be different reasons why a handover might be conducted:

- When the phone is moving far away from the world coated by one cell and getting into the world coated by another cell decision is transferred to the second cell so as to avoid call termination once the phone gets outside the vary of the primary cell [4].
- When the capability for connecting new decisions of a given cell is employed up associate degreed an existing or new call from a phone, that is found in a section overlapped by another cell, is transferred thereto cell so as to free-up some capability within the 1st cell for different users, United Nations agency will solely be connected thereto cell [6].
- In non-CDMA networks once the channel utilized by the phone becomes interfered by another phone victimization constant channel during a totally different cell, the decision is transferred to a unique channel within the same cell or to a unique channel in another cell so as to avoid the interference.

2. Comparison

In addition to the above classification of *inter-cell* and *intra-cell* classification of handovers, they also can be divided into hard and soft handovers[1].

- **Hard handover**

Is one in which the channel in the source cell is released and only then the channel in the target cell is engaged. Thus the connection to the source is broken before or 'as' the connection to the target is made for this reason such handovers are also known as *break-before-make*. Hard handovers are intended to be instantaneous in order to minimize the disruption to the call. A hard handover is perceived by network engineers as an event during the call. It requires the least processing by the network providing service. When the mobile is between base stations, then the mobile can switch with any of the base stations, so the base stations bounce the link with the mobile back and forth.[6] This is called 'ping-ponging'. Hard handoff can be further divided s intra and inter cell handoffs.

- **Soft handover**

Is one in which the channel in the source cell is retained and used for a while in parallel with the channel in the target cell. In this case the connection to the target is established before the connection to the source is broken, hence this handover is called *make-before-break*. The interval, during which the two connections are used in parallel, may be brief or substantial.[2] For this reason the soft handover is perceived by network engineers as a state of the call, rather than a brief event. Soft handovers may involve using connections to more than two cells: connections to three, four or more cells can be maintained

by one phone at the same time. When a call is in a state of soft handover, the signal of the best of all used channels can be used for the call at a given moment or all the signals can be combined to produce a clearer copy of the signal. The latter is more advantageous, and when such combining is performed both in the downlink (forward link) and the uplink (reverse link) the handover is termed as *softer*. Softer handovers are possible when the cells involved in the handovers have a single cell site. Soft handoffs can be classified as multi ways and softer handoffs.

Handover can also be classified on the basis of handover techniques used. Broadly they can be classified into three types:

1. Network controlled handover
2. Mobile phone assisted handover
3. Mobile controlled handover

An advantage of the laborious relinquishing is that at any moment in time one decision uses only 1 channel. The laborious relinquishing event is so terribly short and typically isn't perceptible by the user. within the recent analog systems it may well be detected as a click or a really short beep; in digital systems it's unnoticeable. [5] Another advantage of the laborious relinquishing is that the phone's hardware doesn't got to be capable of receiving 2 or additional channels in parallel, that makes it cheaper and less complicated. an obstacle is that if a relinquishing fails the decision is also quickly non-continuous or perhaps terminated abnormally. Technologies that use laborious handovers typically have procedures which may re-establish the association to the supply cell if the association to the target cell can't be created. but re-establishing this association might not invariably be attainable (in that case the decision are terminated) and even once attainable the procedure might cause a short lived interruption to the decision.
One advantage of the soft handovers is that the association to the supply cell is broken only if a reliable association to the target cell has been established and so the possibilities that the decision are terminated abnormally because of failing handovers ar lower.

3. Handoff Prioritization

Handoff fails for several reasons like, if no channel is out there within the candidate cell. one among the ways in which to cut back the football play failure rate is to prioritise football play. [3] football play algorithms attempt to minimize the quantity of football plays that provide poor performance in improvement is obtained by prioritizing handoff. 2 basic ways of football play prioritization ar guard channels and queuing of football play.

- Guard Channels: Guard channels improve the likelihood of palmy handoffs by reserving a hard and fast or dynamically adjustable variety of channels solely for handoffs. Associate in Nursing adjustive variety of guard channels will facilitate scale back this drawback [1].
- Queuing of football play: Queuing could be a means of delaying handoff. The MSc queues the football play requests rather than denying access if the candidate BS is busy. [7] The likelihood of a palmy football play is improved by queuing football play requests at the price of exaggerated new decision block likelihood and a decrease within the quantitative relation of carried to admitted traffic since new calls don't seem to be assigned a channel till all the football play requests within the queue ar served.

In cellular wireless networks, it's important to upset Mobile station football play between cells so as to take care of an eternal and QOS bonded service. [13] There ar four basic forms of football play protocols are:-

- Network controlled football play (NCHO)
- Mobile aided football play (MAHO)
- Soft football play (SHO)
- Mobile controlled football play (MCHO)

For voice calls ,it not solely causes annoyance to the users born decisions additionally imply exaggerated wireless information measure consumption since a born call needs to be established, resulting in ineluctable consumption of your time and information measure. [11] The GSM technology, on the opposite hand, uses MAHO football play during which the MSc makes football play choices exclusively on one criterion of RSSI measurements rumored by Associate in Nursing MT.The guard channel approach likewise because the MAHO theme will one by one lead to redundant loss of football play calls.

4. MAHO Compare MCHO

Mobile assisted handoff is a process that is used to allow a mobile phone to assist the base station in the decision to transfer the call to another base station. The mobile radio assists by providing RF signal quality information that typically includes the received signal strength indication RSSI and bit error rate.MAHO is an official term of the GSM system. [12] The mobile device transmits on one slot receives on one slot and has 6 idle slots available in each frame.

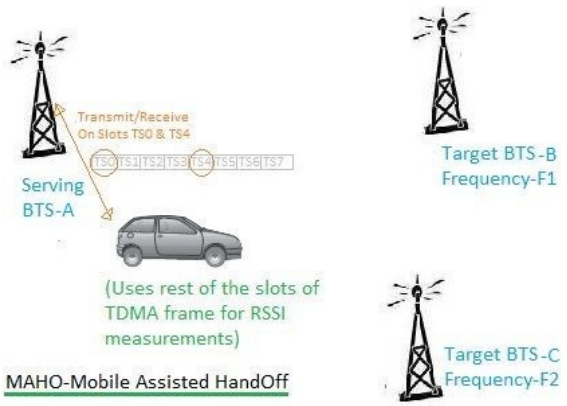

Figure 1.1 MAHO Architecture

In Figure 1.1 mobile assisted handoff used in TDMA based frame structure typically used in GSM system.TS4 time slots for conversations with BTS-A. In order to perform handoff mobile continuously performing RSSI measurements.RSSI stands for received signal strength indication. [6] From the neighbor cell measurements, mobile decides on which cell or BTS to handoff.

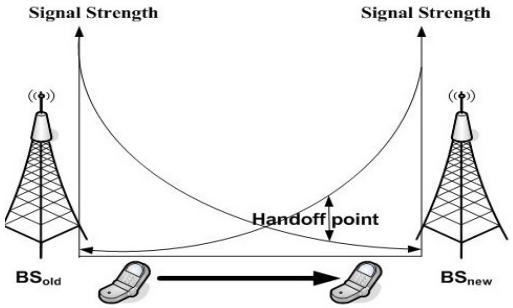

Figure 1.2 MCHO Process

A better method is to use the averaged signal levels relative to a threshold and hysteresis margin for handoff decision.[6] Furthermore, the condition should be imposed that the target base station's signal level should be greater than that of the current base station.

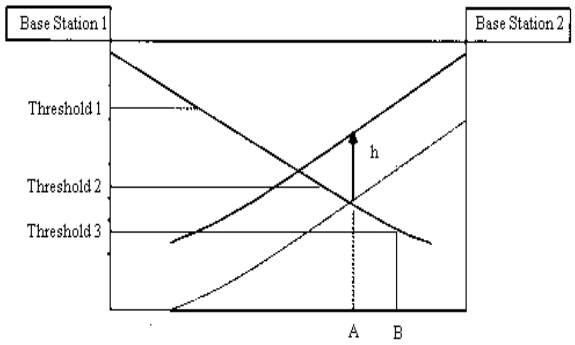

Figure 1.3 Base station hysteresis margins

When a mobile user travels from one area of coverage or cell to another cell within a call's duration the call should be transferred to the new cell's base station.

The handoff should take place at point A for the choice of Threshold 1 or Threshold 2. The handoff should take place at point B for Threshold 3. In has now been shown in practice that using the hysteresis margin greatly reduces the number of unneeded handoffs.[4] However, there is a delay factor involved here. It will be shown later that one may set up optimum trade off values for the parameters threshold and hysteresis to obtain a tolerable delay.

Because of the increasing demand for wireless services, the obtainable channels among the cells become meagerly to support the growing variety of users. [5] to extend the system capability, techniques like cell cacophonic and sectoring is also enforced. mistreatment microcells conjointly improves cellular system capability, and it's a horny various to the 2 former mentioned techniques. [2] whereas the cluster of cells might maintain a selected space of coverage, the co-channel interference is reduced. Decreasing the co-channel interference will increase the system capability while not trunking unskillfulness degradation inherent to sectoring. However, innate to microcells is that the increase in frequency of handoffs. thus we have a tendency to look for economical call algorithms to realize less unneeded handoffs, nevertheless a lot of reliable handoffs with low block likelihood and low likelihood of lost calls. Mobiles on the move in microcells can face line of sight (LOS) handoffs and non line of sight (NLOS) handoffs. within the case of NLOS, fully reliable handoffs area unit troublesome to realize.[9,7,11] a tangle with microcells is that the thus known as corner impact. once a mobile station moves around a corner like at a street intersection, there will be a sharp come by the received amplitude. It loses its LOS element with the serving base station.[7] currently if the mobile user doesn't join up with this new base station B quick enough, the decision gets born. moreover, the mobile will cause interference to the new base station. the bottom station is unable to control the facility of the mobile and users among this cell area unit blocked.

A problem with quicker football play is that we have a tendency to lose the advantages related to signal averaging and physical phenomenon. As was mentioned before, this was useful in mitigating unneeded handoffs and ping ponging. The football play should be quick.[13] currently recall that so as to initiate a football play the movement of the mobile station from one cell to a different should be detected. A reliable technique to form this detection and to accommodate the movement is to live the received signal strength to the bottom stations and from the user.

$$P_u := \left[\int_{-\infty}^{\infty} f(x) \cdot \left(\frac{1}{2} \cdot \operatorname{erf}\left(x - \frac{h - \Delta_L}{\sigma} \right) \right) dx \right] \cdot \left[\int_{-\infty}^{\infty} f(x) \cdot \left(\frac{1}{2} \cdot \operatorname{erf}\left(x - \frac{h + \Delta_L}{\sigma} \right) \right) dx \right]$$

$$\frac{1}{\sqrt{2 \cdot \pi}} \cdot e^{-\frac{x^2}{2}}$$

$$\delta_{hM} := \frac{T}{2} + K_{rv} \cdot \frac{10^{\frac{h - \sigma}{K_2} - 1}}{10^{\frac{h - \sigma}{K_2} + 1}}$$

$$v_{estimate} := \frac{n + 1}{k} + \frac{a^{n+1} \cdot e^{-k \cdot a} - b^{n+1} \cdot e^{-k \cdot b}}{\sum_{i=0}^{n} \frac{n!}{(n - i)! \cdot k!} \cdot \left(a^{n-i} \cdot e^{-k \cdot a} - b^{n-i} \cdot e^{-k \cdot b} \right)}$$

$$k := \prod_{i=1}^{n} c_i t_i$$

Strategy 1) All the users that are new are placed in a microcell. The idea is to simply move the user to a larger cell if the dwell time spent in that microcell is short in relation to a threshold parameter T.

Strategy 2) Like strategy 1, all new users are put into the service of a microcell. However here, users are updated regularly between cell levels base on continuous dwelling duration measurements.

Strategy 3) Make a record of all past cell dwell times spanning a call. Use ML estimators to approximate the speed. Make an appropriate level handoff decision based on those estimates.

Strategy 4) This is similar to strategy 3 except that MMSE is used to estimate mobile station speed.

5. Conclusion

As we tend to square measure moving towards the fifth generation mobile systems, the necessity for rising coverage, systems. AN classification of various sorts of football plays also are explained and a comprehensive survey on vertical football play deciding parameter's and deciding rules that helps in choice of most fitted vertical handoff deciding algorithm for choosing best network. it's the primary time that DNCBP is employed as a way of constructing football play rule call. In addition; future work includes affordable weight choice on vertical football play call operate.

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