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A Study on Minimization of 2G/3G Handover Failure

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Abstract— ***One of the most interesting 3G networks feature is their integration with the 2G networks. It provides seamless End to-End services. Current widely deployed 2G and 3G networks provide enabling interoperability. These mechanisms include Inter RAT idle mode reselection. Inter RAT dedicated mode reselection is used for PS (Packet Switching) services. The WLAN coverage on one hand provides an extra coverage in the low signal strength region. We perform the channel scanning with in the WLAN coverage area. To reduce the handover failure due to scanning delay.***

Keywords— ***Handover, Inter RAT, Signal Strength, Call Handling Mechanism, Ping-Pong effect.***

1. INTRODUCTION

The purpose of the 2G/3G handover procedure is to keep the service provided to the UE (User equipment), while moving away from the coverage area of one 2G/3G to another 2G/3G.The handover process is completely achieved. Measurements done by the mobile UE on the neighbour cell selection of the best candidate cell. That fulfils the handover criteria condition. To increase the signalling messages on the network. This is known by the ping-pong effect. There are two handover directions described below 3G-to-2G inter-RAT HO, 2G-to-3G inter-RAT HO and Call Handling mechanism.

1.1 2G-to-3G Handover direction:

In the 2G to 3G direction. Mobile Station terminals that is ready to be served in the 3G service layer. Operators deploy 3G services in two strategies. The first strategy is to extend the coverage of the deployed GSM network. To co-locate 3G sites side-by-side of the existing GSM sites. Decision to handover the UE/MS from the serving GSM cell to one possible target 3G. CPICH Ec/Io reflects 3G cell signal quality at the UE/MS location. The main causes of the undesired ping-pong phenomena. [1]

1.2 3G-to-2G Handover direction:

The mobile UE performs measurements on the 2G neighbour cells. The triggering conditions are fulfilled. These triggering conditions take into consideration the signal quality. The measured CPICH Ec/Io value and also the cell load presented by the UL interference level seen by the Node B. The best cell among the neighbour cells that fulfils the HO criteria is to be selected for HO execution. [1]

2 CALL HANDLING MECHANISM

Handover in cellular network are very important to maintain the quality of a call. In this section a couple of enhancements which can improve the performance of 3G handover algorithms are presented and studied. It is of following types

2.1 Conventional Handover Mechanism

In cellular network both the mobile station and the BTS regularly measures the radio signal strength. The mobile station transmits its measurements reports continuously to the BTS. If the BTS detects a decrease in radio signal under a minimal level d urge, cf it initiates a handover request as shown in figure. The BTS then informs the BSC about the request, which then verifies if it is possible to transfer the call into a new adjacent cell. Actually the BSC checks weather a free channel is available in the new adjacent cell or not. In this situation the BSC does not differentiate between the channel requests either for fresh call or handover. If a free channel is available in the new adjacent cell then handover request can be satisfied, and the mobile station switch to new cell. If there is no free channel in the adjacent cell then it increases the dropping probability of handover call. The drawback of this handover procedure is the fact that the handover request for channel is same as used for fresh calls cf. In conventional handover mechanism is very problematic from the users quality of service perspective, since user can much prefer block a fresh call rather than to be dropped a call in the middle of transmission.

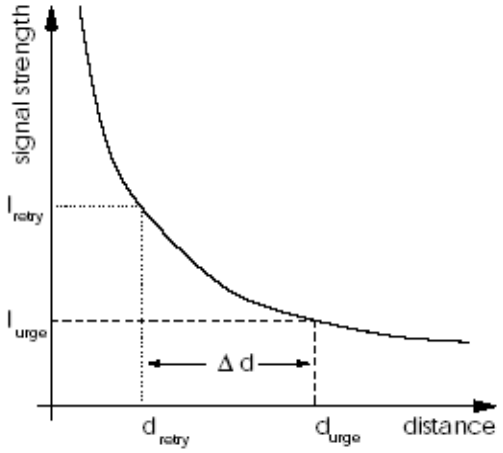

Figure: Signal Levels for Handover

2.2 Channel Carrying Handover Mechanism

The channel carrying mechanism allows a mobile station to carry its current channel from one cell to another when it moves across the boundaries under specific conditions. The channel carrying mechanism using a linear cellular system model in which cells or BTS are arranged in linear configuration with minimum reuse distance r as shown in the figure. Suppose N be the total number of channels available for use in cellular system. Two cells can use the same set of channel as they are apart by distance r.

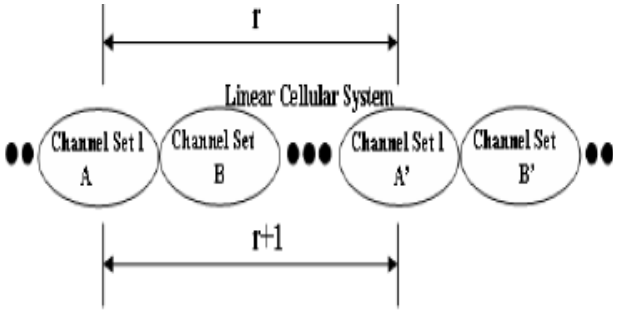

Figure: r and (r+1) channel carrying

To avoid the co-channel interference an advance solution is proposed in which the distance of identical sets of channels is increased to r+1 instead of r. The distance r is the minimum reuse distance or reuse factor. According to the figure the total number of available channels in each cell is now reduced by amount of N/r+1 where N is the total number of available channels. In typical situation where the smaller the reuse distance the more amount of channels is to be lost. The channel carrying mechanism does not require the complex power control or global channel coordination which simplifies its implementation. Handover request are greatly favoured over new calls compared to the Conventional handover mechanism. The main drawback of this handover procedure is not suitable for metropolitan environment due to the great amount of channels lost. [9]

2.3 Handover Prioritization Schemes

Different ideas and approaches are proposed to reduce the handover dropping probability. One approach is to reduce the handover failure rate is to prioritize handover call over new calls. Handover prioritization schemes have a significant impact on the call dropping probability and call blocking probability. Such scheme permits high utilization of bandwidth while guaranteeing the quality of service of handover calls. Basic method of handover prioritization schemes are guard channels (GC), call admission control (CAC) and handover queuing schemes. Some times these schemes are combined together to obtain better results.[10]

2.4 Guard Channel Prioritization Scheme

The guard channel scheme was introduced in 80s for mobile cellular systems. However the guard channel scheme are still used in telecommunications with the name of Cut-off Priority Schemes. GC scheme improving the probability of successful handover by simply reserving a number of channels exclusively for handover in each cell. The remaining channels can be shared equally between handover and new calls. GC are established only when the number of free channels is equal to or les than the predefined threshold g as shown in figure. In this situations fresh calls are bypassed and only handover request are served by the cell until all channels are occupied. The GC scheme is feasible because new calls are less sensitive to delay than the handover calls.[11]

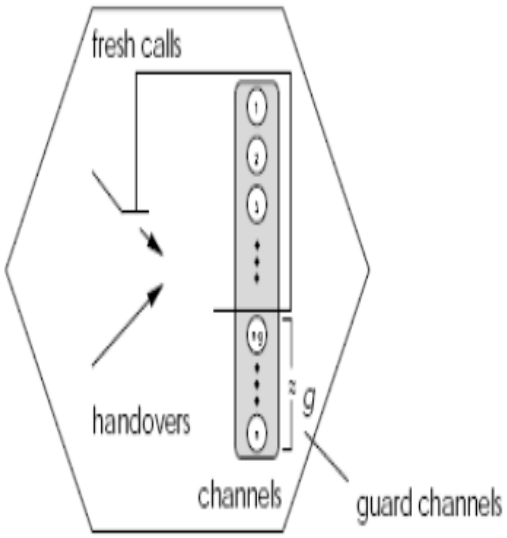

Figure: State Transition Diagram of Guard Channels

If we consider a cellular network with C the total number of channels in a given cell. According to GC scheme reserve channels for handover are C-T where T is the predefined

threshold. The GC will not accept any new call until the channel occupancy goes below the threshold. Suppose the arrival of new and handover call is denoted with λ □ and ν respectively. The call holding and call residency for both call is exponentially distributed with 1/μ and 1/η respectively. The total traffic can be calculated as ρ= (λ + ν) / (μ+ η).

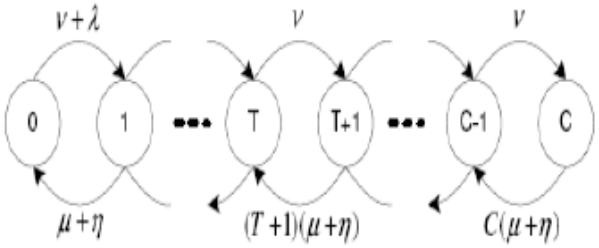

Figure: Shows the state transition diagram of guard channels.

2.5 Call Admission Control Prioritization Scheme

The call admission control scheme refers to the task of deciding whether new call requests are admitted into the network or not. In the CAC the arrival of new call are estimated continuously and if they are higher than the predefined threshold level then some calls are restricted (blocked) irrespective of whether a channel is available or not to decrease the probability of handover calls. In the CAC both the new and handover calls have to access to all channels. If a new call that is generated in cell cannot find an idle channel the call is discarded immediately. There is no queue
provided for the new calls to wait. The CAC scheme can be classified into different schemes that consider the local information like (the amount of unused bandwidth in cell where the user currently resides), remote information (the amount of unused information bandwidth in the neighbouring cells) or local or remote information to determine weather to accept or reject a call. CAC based on knowledge of both network and user characteristics, keeps the track of available
system capacity and accommodates new call request while ensuring quality of service for all existing users. Decisions in CAC are performed in each BSC in a distributed manner and there is no central coordination. [12]

3 Background related work

Improving the handoff technologies of cellular as well as IEEE 802.11 based networks. In the past few years methods based on neighbour graph and geo-location on AP as been proposed. Inter-RAT handover performance 2G and 3G.Overlap area assisted call admission for communication system.

4 Proposed work

We proposed to minimization of Handover failure. The handover mechanism is introduced and discussed the idea of the cell overlap. We also used the call handling mechanism and radio parameter. we would present how the probability that a connection executes a handover from 2G cell to 3G cell and another probability from 3G cell to 2G cell has been calculated.

There may be one solution is the combination of two approaches named as, 1.Travelling time prediction using RSS measurement and speed information, 2.Time threshold calculation for minimization hand over failure.

\ 5 Conclusion

Minimization of 2G/3G handover failure is an important telecommunication feature.

We provide a brief description of feature in the two directions.

1. Call handling mechanism is used.
2. Radio parameter is used.

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References

[1] 2G/3G Inter-Rat Handover Performance Analysis A. Mohammed, H. Kamal2, S. AbdelWahab2 'Department of Signal Processing, Blekinge Institute of Technology, 372 25 Ronneby, Sweden. (2007)

[2] Akyildiz, I., Xie, J. and Mohanty, S.: "A Survey of Mobility Management in Next-Generation All-IP-Based Wireless Systems", IEEE Wireless Communications, vol.11, pp. 16-28, (2004).

[3] Gustaffson, E. and Jonsson, A.:" Always Best Connected", IEEE Wireless Communications, vol. 10, pp. 49-55, (2003).

[4] D. Sarddar et all, "Minimization of Handoff Latency by Angular Displacement Method Using GPS Based Map ", IJCSI International Journal of Computer Science Issues, Vol.7, Issue 3, No 7, May 2010.

[5] Earl J. Lum "The Evolution of the BTS Market: Towards 4G Technology" CS MANTECH Conference, May 17th-20th, 2010, Portland, Oregon, USA .

[6] Abdulova, V., and Aybay, I. (2006) *Handoff Prioritizing Schemes in Cellular Wireless Networks*. IEEE Computer Networks Symposiums.16 (18), pp 1-6.

[7] 1CH. M.H. Saibaba 2Prof. Ravindra Babu Kallam 2Dr. M. ThirupathiReddy (2010) Eradication of Magnetic Radiations Produced By Mobiles Devices http://www.ijcaonline.org/journal/number7/pxc387278.pdf

[8] http://en.wikipedia.org/wiki/Wireless_LAN_Wikipedia,fre Encyclopedia. (2002)

[9] Li, J., Shorff, N and Chong, E (1996) *Channel Carrying: A Novel Handoff Scheme for Mobile Cellular Networks.* [Online].ECE Technical Reports. http://docs.lib.purdue.edu/ecetr/98

[10] Tripathi, N., Nortel, Jerry, R and Vanlandingham. (1998)
Handoff in Cellular Systems. [Internet] .IEEE Personal Communication.
https://www.cs.tcd.ie/~htewari/papers/tripathi98.pdf
[11] Katzela, I and Naghshineh. (1996) Channel Assignment Scheme for Cellular Mobile Telecommunication Systems- A Comprehensive Survey, IEEE Personal Communications, 3 (3): pp.10-31.
[12] Yliopisto, O. (2005) *Smart Packet and Call Admission Control for Efficient Resource Management in Advanced Wireless Networks*. PhD Dissertation. University of Oulu, Finland.
[13] Insitute of Electrical and Electronics Engineers. IEEE Std 802.12TM-2008. Part 21: Media Independent Handover Services, 2008.
[14] Insitute of Electrical and Electronics Engineers. IEEE Std 802.16TM-2009. Part 16: Air Interface for Broadband Wireless Access Systems, 2009.
[15] Internet Engineering Task Force. Website: http://www.ietf.org/.
[16] T. Inzerilli and A. M. Vegni. A reactive vertical handover approach for WiFi-UMTS dual-mode termi- nals. In Proc. of IEEE International Symposium on Consumer Electronics (ISCE), pages 1–4, Algarve,
Portogallo, April 2008.
[17] G. Lampropoulos, N. Passas, L. Merakos, and A. Kaloxylos. Handover management architectures in integrated WLAN/cellular networks. IEEE Communications Surveys & Tutorials, 7(4):30–44, October 2005.
[18] H. K. Lee, V. Hall, K. H. Yum, K. I. Kim, and E. J. Kim. Bandwidth estimation in wireless LANs for multimedia streaming services. Hindawi Journal on Advances in Multimedia, 2007(1), January 2007.
[19] M. Li, M. Claypool, and R. Kinicki. Wbest: a bandwidth estimation tool for IEEE 802.11 wireless networks. In IEEE Conference on Local Computer Networks (LCN), pages 374–381, Montreal, Canada,October 2008.
[20] J. Manner, M. Kojo, T. Suihko, P. Eardley, and D. Wisely. IETF RFC 3753, Mobility related termi- nology, 2004.

