ISSN (Print) : 2319-5940
ISSN (Online) : 2278-1021

*International Journal of Advanced Research in Computer and Communication Engineering*
*Vol. 2, Issue 7, July 2013*

# Automatically Optimization technique using a DNCL to avoid dropped calls in Cellular Network

Sachin Arora[1], Sumit Chaudhary[2], Sangeeta Solanki[3]

Assistant Professor, Electronics & Communication, Shri Ram Group of Colleges, Muzaffarnagar, India [1]

Assistant Professor, Computer Science, Shri Ram Group of Colleges, Muzaffarnagar, India [2]

Assistant Professor, Computer Science, Shobhit University, Meerut, India [3]

**Abstract**: Dropped calls can be avoided in cellular networks by an Automatically Optimization algorithm. An optimization technique have been generated using a DNCL (Dynamic Neighbor cell listing), which uses an automatically optimization algorithm to avoid call drop in cellular networks. In cellular networks the Dynamic Neighbor cell list (DNCL) has an important impact on the number of dropped calls and is traditionally optimized manually with the help of planning tools. We have used a method which automatically optimizes DNCL, which consists of a self configuration phase for initialization, followed by a self-optimization phase which further refines the DNCL based on measurements provided by mobile stations during the network operation. The proposed method performance is evaluated for different user speeds and different DNCL sizes. Besides, the convergence speed of the proposed self-optimization method is evaluated. It is shown that automatically optimization method reached a stable maximum performance about 99% of success rate when about 6000 measurements are reported by mobile stations.

**Keywords**: Dynamic Neighbor Cell list, automatically optimization, automatically configuration, cellular network.

## I. INTRODUCTION

Handover is one of the most critical and important issues in cellular networks. It enables continuity of a connection for mobiles during their movement and allowing the efficient use of various resources (e.g., time and frequency reuse between cells). Today most of cellular standards use mobile-assisted handover i.e. Mobile measures the pilot channel signal quality of neighbor cells and reports the measurement result to the network [1][2]. If the quality of signal from a neighbor cell is better than that of the serving cell then the network initiates a handover to that cell. In Today's world, commercial cellular networks use a dynamic neighbor cell list (DNCL) to control the neighbor cell measurements. For the measurement of neighbor cells, mobiles should be provided with the information on the pilot channels of neighbor cells [3] (e.g., dynamic cell synchronization information, channel frequency). If the network is not provide this information to the mobiles then the mobiles have to spend a longer time to acquire it via scanning through all possibilities. The list contains information of the selected handover candidates and is sent to all mobiles connected to the cell. The mobility performance of the dynamic neighbor cell list has an important influence [4][5]. To ensure that any mobile in the serving cell can find at least one handover target when its own signal dilapidate, must contain a sufficiently large number of potential dynamic neighbor cells. However, a long list can result in delays in finding a suitable handover target, as the mobile measurement capacity is limited. When the user moves at high speed then these delays may cause call drops [7]. While it is not as simple in reality, to configure a neighbor cell list by simply looking at the cell topology and selecting all cells overlapping with the cell of interest. In recent practice, when new cells are entered, the DNCL is still manually configured at the beginning of the network deployment by means of planning and controlling tools, and is manually updated [8][9]. During this manual configuration the cell coverage and the neighbor relation are predicted using static information such locations of that base station, battery power of the cell, antenna patterns, and received signal strength and maps. Therefore, the manual configuration and optimization of the neighbor cell list is a non-trivial problem that requires efforts for the operator that is related to network, resulting in considerable operational depreciate. In addition, the Next Generation Mobile Network (NGMN) alliance recently specified neighbor cell list automatically-optimization and described its benefits for the network operator[10][11].

## II. BACKGROUND

The mobiles only need to monitor the pilot signal quality of the cells included the DNCL of the serving cell[12]. The neighbor cell list has an important impact on the mobility performance and it must surely and sufficiently contain a large number of potential neighbor cells to ensure that any

ISSN (Print) : 2319-5940
ISSN (Online) : 2278-1021

*International Journal of Advanced Research in Computer and Communication Engineering*
*Vol. 2, Issue 7, July 2013*

mobile in the serving cell can find at least one handover target when its own signal becomes weak. However, a long list can result in delays in finding a suitable handover target, as the mobile measurement capacity is limited. When the user moves at a high speed then these delays may cause call drops[14][15]. While it might appear easy to configure a neighbor cell list by simply looking at the cell topology but it is very difficult in reality. This is mainly due to the fact that the real radio coverage is unknown. For instance, the presence of unpredicted buildings, trees, and other moving objects may have effect on the coverage which is not predicted by the model and also changes in the environment cannot easily be taken the neighbor list account[18]. Thus, to predict the accuracy of the cell coverage is very difficult and also may not be valid anymore after some time. In recent practice, at the beginning of the network the DNCL is manually configured by the means of planning and controlling tools, and is manually updated when new cells are installed. During this manual configuration the coverage of cell and the neighbor relation are predicted using static information such location of base station, and received signal strength and maps [22][23]. Due to the sensibility and the condition of radio propagation, these static predictions of the cell coverage are more or less inaccurate, and cannot take changes in the conditions of radio into account.

## III. PROPOSED WORK

Automatically configuration and optimization of DNCL is done in Two Phases. These phases are divided as PHASE I and PHASE II and after that the architecture of DNCL is shown. Architecture of how DNCL works is also shown below.

**Mechanism & Architecture:**

**PHASE I: DNCL AUTOMATICALLY CONFIGURATION ( )**

```
// DNCL = Dynamic Neighbor Cell List //

NC Identification ( )
{
For (i = 0; i <= N; i++)
        {
        If (M_NC >= M_NCT)
                {
                NC is able to enter in the DNCL;
                }
        }
}
      /* M_NC = Measurement of Neighbor Cell.
         M_NCT = Measurement of Neighbor Cell Threshold.
 NC = Neighbor Cell.
*/
```

**PHASE II: DNCL AUTOMATICALLY OPTIMIZATION ( )**

```
DNCLAutomaticallyOptimization ( )
{
CLT, PSQ_min, AS_max, NCL = null;
For (i=0; i<=32; i++)
        {
If (AS_max > NCL)
{
For each LC of CLT do
{
        m_j =0;
        For each LR of CLT do
                {
        If (CLT [LR, LC] >= PSQ_min)
                        {
                        m_j = m_j+1;
                        }
                }
        }
}
If (max_j (m_j) > 0)
                {
        j* = argmax (m_j);
        add cell identified by column j* to the NCL;
for each LR of CLT do
                        {
                        If (CLT (LR, LC*) >= PSQ_min)
                                {
                                Remove LR from CLT;
                                }
                                Remove LC* from CLT;
                        }
                        Else
                                {
                                Return NCL;
                                }
                }
                }
}
                /*CLT = Cell listing Table
  PSQ_min = Pilot Signal Quality
   received by the mobile
   is higher than a minimum
   requirement.
  AS_max = Maximum Allowable Size
          NCL = Neighbor Cell List
                LC = List Column
                LR = List Row
                */
```

ISSN (Print) : 2319-5940
ISSN (Online) : 2278-1021

*International Journal of Advanced Research in Computer and Communication Engineering*
*Vol. 2, Issue 7, July 2013*

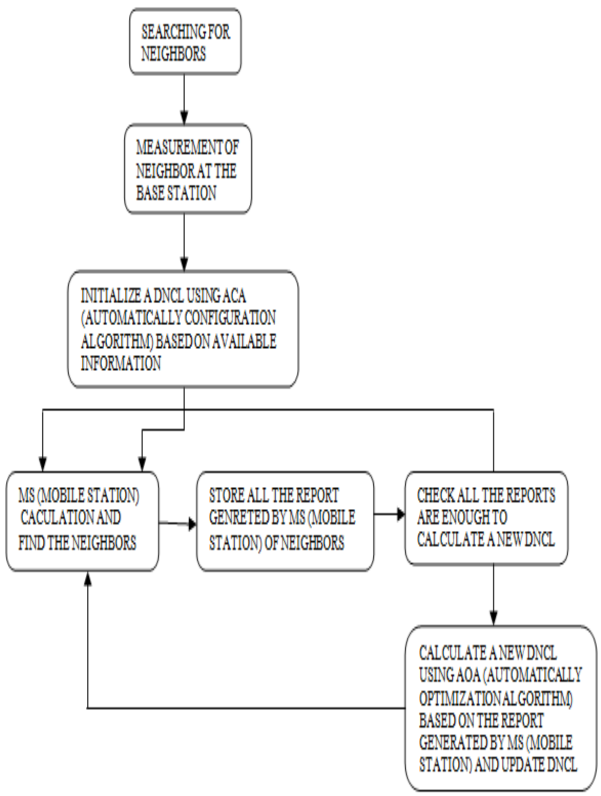


**Fig 1: ARCHITECTURE OF DNCL (Dynamic Neighbor Cell List)**

## IV. CONCLUSION

In this paper an efficient algorithm is presented, which automatically configure DNCL by identifying NC (neighbor cell) and also optimize DNCL. Architecture of DNCL is also shown in above figure which improves the algorithm by clearing the whole scenario which proves the whole work to be good and efficient and strong enough to avoid dropped calls.

## V. FUTURE SCOPE

The proposed algorithm in this paper is reliable for cellular network but only in a limited area and more research work can be done for large areas as network is scalable, heterogeneous and is fully composite with respect to ongoing advancement in this field**.**

## REFERENCE

[1] M. Zonoozi and P. Dassanayake, "User mobility modeling and characterization of mobility patterns," IEEE Journal on Selected Areas in Communications, vol. 15, no. 7, pp. 1239–1252, Sept. 1997.
[2] ] NGMN Alliance, "Use cases related to self-organising network: Overall description," Tech. Rep. v2.02, Dec. 2008.
[3] D. Soldani and I. Ore, "Self-optimizing neighbor cell list for UTRA FDD networks using detected set reporting," in IEEE VTC2007-Spring, 2007, pp. 694–698.
[4] D. Soldani and I. Ore, "Self-Optimizing Neighbor Cell Lists for UTRA FDD Networks Using Detected Set Reporting," IEEE Vehicular Technology Conference, 2007.
[5] J. Baliosian and R. Stadler, "Decentralized Configuration of Neighboring Cells for Radio Access Networks," 1st IEEE Workshop on Autonomic Wireless Access (in conjuction with IEEE WoWMoM), 2007.
[6] F. Parodi, M. Kylväjä, G. Alford, J. Li, and J. Pradas, "An Automatic Procedure for Neighbor Cell List Definition in Cellular Networks," 1st IEEE Workshop on Autonomic Wireless Access (in conjuction with IEEE WoWMoM), 2007.
[7] K.-W. Chin, D. Lowe, and W.H.O Lau, "Routing in MANETs with Address Conflicts," International Conference on Mobile and Ubiquitous Systems: Networking and Services, 2005.
[8] 3GPP TS 36.300 v8.0.0, "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRAN); Overall description; Stage 2"
[9] TEMS Cellplanner Universal, http://www.ericsson.com/solutions/tems/ [19] J. Laiho, A. Wacker, T. Novosad, editors, Radio Network Planning and Optimization for UMTS, John Wiley & Sons, 1st edition, 2002.
[10] Qualcomm CDMA Technologies. (n.d.). Retrieved April 17, 2005, from http://www.cdmatech.com/ resources/glossary full.jsp
[11] J. Zhang, A Cell ID Assignment scheme and its applications, in Proceedings ICPP Workshop on Wireless Networks and Mobile Computing, Toronto, Canada, August 2000, pp. 507–512.
[12] W. Wang and M. Zhao, "Joint effects of radio channels and node mobility on link dynamics in wireless networks," in IEEE INFOCOM'08, Apr. 2008, pp. 933–941.
[13] ] Z. Altman, et al., 'Final system definition and validation', Celtic Gandalf deliverable D2.3, www.celtic- gandalf.org, 2007.
[14] J. Baliosian and R. Stadler, 'Decentralized configuration of neighboring cells for radio access networks', Proceedings of IWAS '07, Finland, 2007.
[15] F. Parodi, et al., 'An automatic procedure for neighbor cell list definition in cellular networks', Proceedings of IWAS '07, Finland, 2007.
[16] G. Hampel, et al., 'The tradeoff between coverage and capacity in dynamic optimization of 3G cellular networks', Proceedings of VTC '03, USA, 2003.
[17] R. van Renesse, K. P. Birman, and W. Vogels. Astrolabe: A robust and scalable technology for distributed system monitoring, management, and data mining. ACM Transactions on Computer Systems, 21(2):164–206, May 2003.
[18] S. Voulgaris and M. van Steen. Epidemic-style management of semantic overlays for content-based searching. In J. C. Cunha and P. D. Medeiros, editors, Proceedings of Euro-Par, number 3648 in Lecture Notes in Computer Science, pages 1143–1152. Springer, 2005.
[19] Y.-B. Lin and I. Chlamtac, Wireless and Mobile Network Architectures, New York: Wiley, 2001.
[20] B. Liang and Z. J. Haas, Predictive Distance-Based Mobility Management for PCS Networks, INFOCOM, New York, 1999.
[21] H. Levy and Z. Naor, Active tracking: Locating mobile users in personal communication ser- vice networks, Wireless Networks, 5, 467–477, 1999.
[22] S. V. Hanly, "An Algorithm for Combined Cell- Site Selection and Power Control to Maximize Cellular Spread Spectrum Capacity," IEEE J. on Selected Areas in Commun., 13:7 (1995), 1332–1340.
[23] ILOG, Inc, CPLEX 6.0, Incline Village, NV, 1998.
[24] W. C. Y. Lee, Mobile Communications Design Fundamentals, John Wiley, New York, NY, 1993.
[25] M. Wegmuller, J. P. von der Weid, P. Oberson, and N. Gisin, "High resolution fiber distributed measurements with coherent OFDR," in *Proc. ECOC'00*, 2000, paper 11.3.4, p. 109.
[26] R. E. Sorace, V. S. Reinhardt, and S. A. Vaughn, "High-speed digital-to-RF converter," U.S. Patent 5 668 842, Sept. 16, 1997.
[27] (2002) The IEEE website. [Online]. Available: http://www.ieee.org/

ISSN (Print) : 2319-5940
ISSN (Online) : 2278-1021

*International Journal of Advanced Research in Computer and Communication Engineering*
*Vol. 2, Issue 7, July 2013*

[28] M. Shell. (2002) IEEEtran homepage on CTAN. [Online]. Available: http://www.ctan.org/tex-archive/macros/latex/contrib/supported/IEEEtran/
[29] *FLEXChip Signal Processor (MC68175/D)*, Motorola, 1996.
[30] "PDCA12-70 data sheet," Opto Speed SA, Mezzovico, Switzerland.
[31] A. Karnik, "Performance of TCP congestion control with rate feedback: TCP/ABR and rate adaptive TCP/IP," M. Eng. thesis, Indian Institute of Science, Bangalore, India, Jan. 1999.
[32] J. Padhye, V. Firoiu, and D. Towsley, "A stochastic model of TCP Reno congestion avoidance and control," Univ. of Massachusetts, Amherst, MA, CMPSCI Tech. Rep. 99-02, 1999.
[33] *Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specification*, IEEE Std. 802.11, 1997.
[34] J. Li, H. Kameda and K. Li, Optimal dynamic mobility management for PCS networks, IEEE/ACM Transactions on Networking, 8, 3, 319–327, 2000.

## BIOGRAPHY

**Sachin Arora** is working as a Assistant Professor in ECE Department at Shri Ram Group of colleges, Muzaffarnagar, (U.P.). He completed B-Tech (Electronics and Communication Engineering) with First Division from S.D College of Engineering & Technology, Muzaffarnagar. During teaching He has been coordinated many Technical fests and National Conferences at Institute Level. He has attended several seminars, workshops and conferences at various levels. His area of research includes Wireless Communication, Handoff Management, VHDL and Various Types of Antennas.

**Sumit Chaudhary** is working as Assistant Professor in CSE department at Shri Ram Group of colleges, Muzaffarnagar (U.P.), INDIA. He obtained his M-Tech (Computer Engineering) with Hons. from Shobhit University and B-Tech (Computer Science) from SCRIET, Meerut (U.P.). He has been in teaching from more than four years. During this short period of time, he has been supervised several dissertation of M.Tech. Students. He has been member of several academic and administrative bodies. During his teaching he has been coordinated many Technical fests and National Conferences at Institute and University Level. He has attended several seminars, workshops and conferences at various levels. His many papers are published in various national, international journals and conferences. His area of research includes Wireless Sensor Network (WSN), Network Security, Neural Network, Artificial Intelligence and MANET (Mobile Ad-Hoc network).

**Sangeeta Solanki** is working as Assistant Professor in CSE department at Shobhit University, Meerut, (U.P.), INDIA. She is pursuing her PhD from Shobhit University, Meerut (U.P.). She obtained her M-Tech (Computer Engineering) with Hons. from Shobhit University and B-Tech (C.S.) from IIMT College of Engineering, Meerut (U.P.), INDIA. She has been in teaching from more than four years. Her many papers are published in various national, international journals and conferences. Her area of research includes MANET (Mobile Ad-Hoc network), Wireless Sensor Network (WSN) and Network Security.