

Reduction of Location update Cost by history Reporting cell in mobile networks

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Abstract—For a cellular network to proficiently deliver services to the cell phone users, the network must have a very competent method to keep track of the users. For the future generations, cellular networks should provide wide bandwidth services; the radio resource becomes more difficult. Many methods have been proposed to reduce the spectrum utilization of the user's location update and paging. We also propose a new scheme reporting cell based history which improves the overall performance of the cellular network. This method cheapens the regularity of accessing the remote home location register which finally minimizes the location update cost. The simulation results show that the proposed method exceeds and all other previous methods in terms of network signaling traffic load irrespective of the mobile mobility.

Keywords: pointer forwarding, profile based scheme, location update cost, VLR,HLR, base station, reporting cell.

1.Introduction: The peculiarity of the cellular communication system is that both voice and data service are provided and the location management scheme is met to service requirements and allowing users roam in different network. For tracking the users, the total service area is divided into some cells. Each cell has a Base Transceiver Station, by using base station the mobile terminals in the cell communicate through a wireless link. The cells grouped in Regional Areas. All base stations in a given RA are wired connected to a mobile switching center MSC and the mobile terminals are connected through wireless to the base stations. HLR is a home location register is the centralized database that contains the records of all mobile terminals with location information for the entire network. VLR is the visitor location register that stores the mobile terminals location details which are currently residing in its

corresponding region. The location management process contains two operations, they are location registration of mobile terminal to inform their position to the network and determining the serving VLR before the service delivery to mobile terminal. In this research various location update strategies are discussed and in this paper we have discussed issues in existing strategies and developed the new proposed system.

2. Related Work: Wenchao Ma proposed “An efficient mobility management scheme based on location anchoring and pointer forwarding” scheme [10]. In Local anchoring scheme, which VLR is near to mobile terminal is designated as local anchor for mobile terminal, and perform its location registration when it moves from one region to another region. The main issue in this local anchor scheme frequent update becomes costly whenever the mobile terminal constantly moving from one region to another region without any call from others.

Ki-Sik-Kong proposed “A forwarding pointer based cache scheme for reducing location management cost in PCS networks” scheme[11]. In forwarding pointer based scheme, there is a pointer setup from the old VLR to New VLR when mobile terminal moves from one region to another region for avoiding frequent update to home location register. For finding the mobile terminal location the home location register is queried first and get the pointer chain, and

through this pointer chain the location mobile terminal traced. In this scheme the location update cost will be reduced but needs more time to deliver one service to mobile terminal by long pointer chain. Brijesh Patel proposed “Differential evolution for solving the mobile management” scheme[12]. The author uses the differential evolution algorithm to find the best configuration of the reporting cell strategies. Sung-soo kim proposed “particle swarm optimization for location mobility management” scheme[13]. They find the optimal set of reporting cell and reduce the total cost for location management.

3. Proposed method: We propose a method by using reporting cell configuration with some modification to improve overall performance of the cellular mobile networks. In this method region is divided into some cells. In this region some cells are appointed as reporting cells. Some cells are designated as non reporting cell. The location registration takes place whenever the mobile user is crossing the reporting cell. This is the general procedure in general reporting cell configuration method. But in proposed method the mobile terminal does not update its location whenever it is roam in the reporting cell which in the mobility pattern. It updates its location whenever it crosses the reporting cell which is not in the history of mobility pattern. Hence automatically the location registration cost is reduced. The entire procedure for proposed method is:

Procedure for Location Registration:

- Each region is divided into some cells and each region contain VLR database.
- Some cells appointed as reporting cells in regions.

- Each region contains visitor location register
- if mobile terminal crosses the reporting cell the location registration done in corresponding visiting location register else if mobile terminal cross the other non reporting cell and the mobile terminal cross the history reporting cell, the location registration does not carry out.
- Mobile terminal update its location whenever it cross the reporting cell which in not in history.
- So, here frequent location registration in home location register is reduced by this reporting cell configuration scheme.

4. Analytical Modeling:

The location updates procedure of the proposed approach:

Step 1. Start

Step 2. Identify the reporting cells (RC), and vicinity cells (VC).

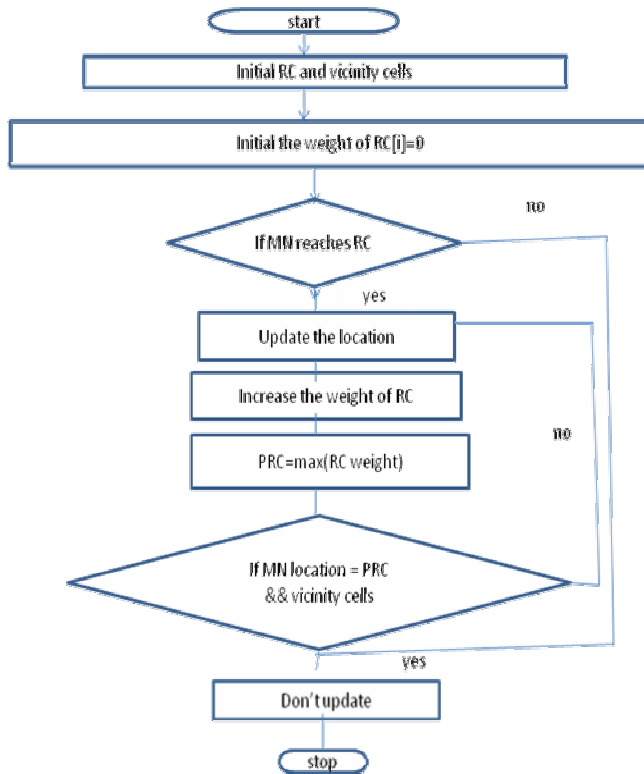
Step 3. Initialize the weight of reporting cell $W_{RC}=0$

Step 4 . If Mobile Node Position $MN_P = RC$
Then
Update the location
 $W_{rc} = W_{rc} + 1 ;$
Else
Don't update the location
(n- number of RC)
For $i=1$ to n ;
 $P_{RC} = \max [RC]$

Step 5. If Mobile Node Position $MN_P = P_{RC}$
Then
Don't update the location
Else
Go to (step 4);

Step 6. Stop.

Methodology:



- In reporting cell based method the mobile terminal update its location whenever it crosses the reporting cell. The mobile terminal does not update its location to mobile switching center whenever it crosses the non reporting cell. Hence the location updates are totally reduced to 4 updates.
- In proposed history based method the mobile terminal update its location whenever it roams in the reporting cell which is not in history. The mobile terminal is not needed to update whenever it roams in the reporting cell with its mobility pattern.

From the above algorithm we find the history reporting cell. The following example explain the update procedure existing general method and reporting cell and proposed history based method.

We take the seven cell network for explanation

- In IP based method the mobile terminal update its location for each move. The mobile terminal update its location to MSC for moving from one cell to another cell. Hence the location updates are totally 7 updaes.

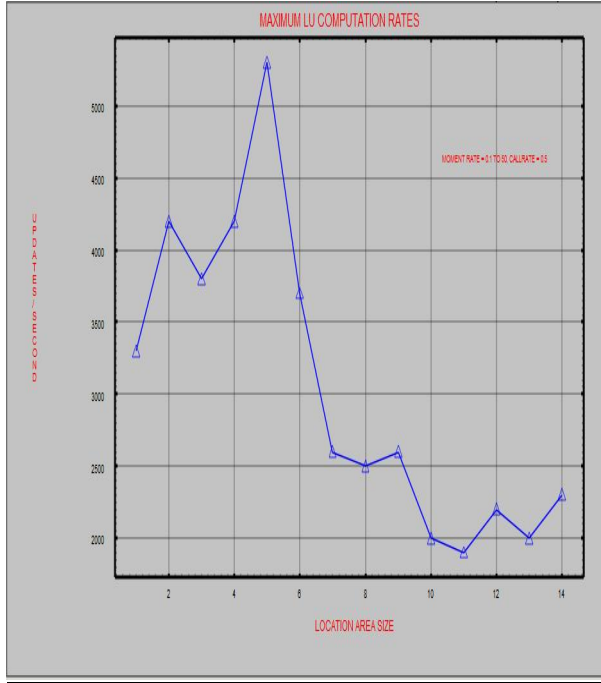
5.Numerical Results and comparison:

After we have estimated number of location updates, we can calculate the location update cost for the proposed system by using the simulation tool NS2. The simulation network size are used 4X4,6X6, 8X8. Mobility model is random way point model.

In the simulation we have given the input moment rate 0.1 to 50 and call rate 0.5. we obtain the following result, in this chart x-axis denoted the number of cell numbers and

y-axis denotes the number of updates in each cell.

Location updates in proposed:



		Reporting cell based	Proposed History based
1	452	271.2	180.8
2	767	460.2	306.8
3	360	216	144
4	548	328.8	219.2
5	591	354.6	236.4
6	1451	870.6	580.4
7	816	489.6	326.4
8	574	344.4	229.6
9	647	388.2	258.8
10	989	593.4	395.6
11	1105	663	442
12	736	441.6	294.4
13	529	317.4	211.6
14	423	253.8	169.2
15	1058	634.8	423.2
16	434	260.4	173.6

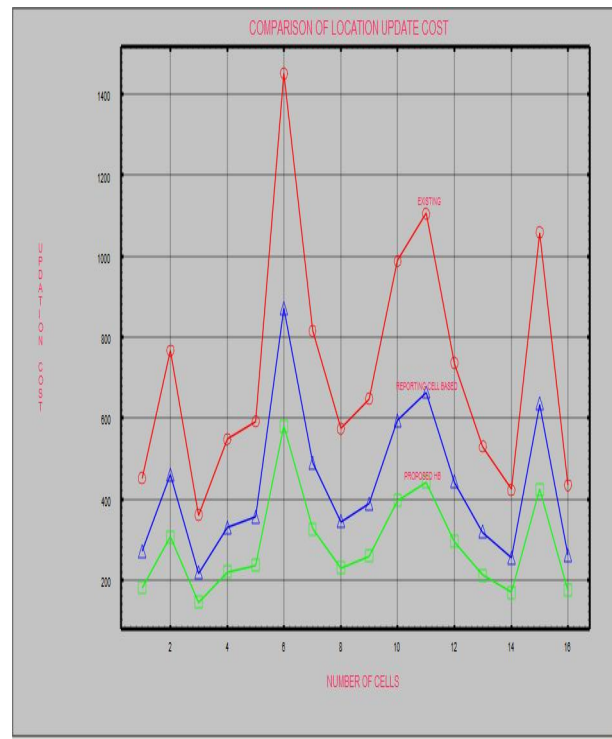
Data sets used:

<u>Cell No</u>	<u>Movement weight</u>	<u>Cell No</u>	<u>Movement Weight</u>
1	452	9	647
2	767	10	989
3	360	11	1105
4	548	12	736
5	591	13	529
6	1451	14	423
7	816	15	1058
8	574	16	434

Location update cost for reporting cell and proposed history based:

<u>Cell No</u>	<u>Movement Weight</u>	<u>Location update cost for</u>	<u>Location update cost for</u>

Comparison of location update cost:



6.Conclusions: In this paper, we analyzed the existing strategies and proposed scheme. The results show that the system performance of proposed system has tight relationship with the users call to mobility ratio. The results suggest that this new scheme only works well. The simulation results also show that the Location update cost is significantly less than the existing schemes.

7. References:

[1] S.S.Kim, L-H.Kim, V.Mani and H.J.Kim, ant colony optimization for reporting cell planning mobile computing using selective paging strategy, International Journal of Innovative Computing.

[2] Dr.S.Thabasu Kannan, N.Shakeela, Pervasive location management using genetic algorithm, International Journal of Research in Computer Science.

[3] N.Shakeela, Dr.S.Thabasu Kannan, Appraisal of different mobility Management Schemes, International Journal of Advanced Research in Computer Science and software engineering.

[4] Ibikunle F.A, and Adegbenjo A, management issues and challenges in mobile database systems, International Journal of Engineering Sciences and Emerging Technologies.

[5] H.Omar, T.Saadawi and M.Lee, Supporting Reduced location management overhead and fault tolerance in mobile ip systems,

[6] Prajapati N.B, and Kathiriya D.R.,, “Dynamic location area planning in cellular network using apriori algorithm”, IEEE , 2015.

[7] Panrija S.R, and Sahu P.K., “Soft computing technique for cost reduction in cellular network”, IEEE , 2014

[8] Gokhan Yavas and Dimitrios Katsaros , “A data mining approach for location prediction in mobile environmnets”, Elsevier, 2005

[9] Yakhlef S. and Hamdan M.A, “ Simulation of location management strategies of timer, location Area, and Movement Based update/Paging for wireless networks.IEEE , 2013

[10] Wenchao Ma, “An efficient mobility management scheme based on location anchoring and pointer forwarding”, IEEE, 2003,Pages 2764-2768.

[11] Ki-Sik Kong, “A forwarding pointer based cache scheme for reducing location management cost in PCS Networks”, Journal of information science and engineering, 2002, Pages 1011-1025.

[12] Brijesh Patel, “A differential evolution algorithm for reporting cell problem in mobile computing’, International journal of engineering research and technology, 2014.

[13] Sung-Soo Kim, “ Particle swarm optimization for location mobility management”, International journal of innovative computing, information and control, 2012, Pages 8387-8398.