ABSTRACT

Continuous cell zooming algorithm is a potential dynamic cell zooming algorithm for energy-efficient operation of mobile wireless networks. In this algorithm, location management strategy (location update process) is required to know the location of the farthest user in each cell to perform cell zooming. However, the application of conventional periodic update scheme in continuous cell zooming algorithm can lead to a high signaling cost. Therefore, in this research, two adaptive location update schemes, namely, Time-Adaptive Periodic Update (TAPU) and Location-Adaptive Periodic Update (LAPU) are proposed aiming to reduce the number of update messages in cell zooming operation. The performances of the proposed adaptive location update schemes are compared with that of Convention Periodic Update (CPU) scheme. Their performances are evaluated in terms of power saving capability, outage ratio and the number of update messages in cell zooming operation in different scenarios in both omni-directional and sector-based cell networks. The results show that the TAPU and LAPU have no significant effect on power saving capability of continuous cell zooming algorithm, however they give less number of update messages in cell zooming operation compared to CPU scheme. However, outage occurs in cell zooming operation with TAPU scheme because it has longer update intervals. Meanwhile the LAPU scheme can eliminate outage in cell zooming operation as CPU scheme does. In the scenario with the variation of total number of users in the network, the results depict that the transmitted power ratio and the total number of update messages in each update scheme increase with the increment of total number of users in the network. Meanwhile, the outage ratio in TAPU has a declined trend with the increase of total number of users in the network.

In the scenario with the variation of average moving speed, the transmitted power ratio achieved by each update scheme has no consistent (increasing or decreasing) trend with the increment of average moving speed due to inconsistent moving behaviour. The outage ratio in TAPU increases with the enhancement of average moving speed of users in the network. The numbers of update messages in both CPU and TAPU are constant and the number of update messages in LAPU has the same trend with transmitted power ratio. In sector-based cell network, larger power saving can be attained. Consequently, a lager outage ratio also occurs in sector-based cell network. Compared to CPU, the total number of update messages is reduced about 50% by TAPU and LAPU in both omni-directional and sector-based cell networks.