Load Balancing Improvement in Normal and Clustered User Distribution LTE Advanced HetNets through a Hybrid Channel-Gain Access-Aware Cell Selection Scheme

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Abstract

In a Macro eNodeBs (MeNBs)-Pico eNodeBs (PeNBs) deployment scenario, adopting the conventional Reference Signal Receive Power (RSRP)-based cell selection in Long Term Evolution (LTE)-Advanced Heterogeneous Networks (HetNets) causes most user equipment (UE) to connect with the MeNBs due to their higher transmit power as against that of the PeNBs, thus leading to serious load imbalance in HetNets. Therefore, this hybrid algorithm combined the channel gain-aware and the access-aware cell association metrics as a single metric for UE to base station association in LTE-Advanced HetNets deployment scenarios. The scenarios considered are the Normal distribution with uniform user distribution, which comprises of 4 PeNBs and 25 uniformly distributed UEs and the clustered distribution, which comprises of 4 PeNBs and 30 UEs, two-third of which are clustered around the the PeNBs as defined by the 3rd Generation Partnership Project (3GPP) standard. The developed Hybrid Channel Gain Access Aware (HCGAA) scheme improved load balancing performance by 25.4% and 12.1%, respectively compared with the 3GPP RSRP and RSRP +CRE cell selection. Also, an
enhanced pico connection ratio of up to 1.40 times and 1.21 times that of the RSRP and RSRP +CRE cell selection schemes was achieved by the HCGAA algorithm. These improvements translate to the efficient utilization of the network resource and prevent crowding of certain cells in the network.

References


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Index Terms

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Keywords

Heterogeneous networks, LTE-Advanced, cell selection, load balancing, pico connection ratio, normal user distribution and clustered user distribution.