Fuzzy Logic Based Self-Adaptive Handover Algorithm for MobileWiMAX.

ABSTRACT

It is well known that WiMAX is a broadband technology that is capable of delivering triple play (voice, data, and video) services. However, mobility in WiMAX system is still a main issue when the mobile station (MS) moves across the base station (BS) coverage and be handed over between BSs. Among the challenging issues in mobile WiMAX handover are unnecessary handover, handover failure and handover delay, which may affect real-time applications. The conventional handover decision algorithm in mobile WiMAX is based on a single criterion, which usually uses the received signal strength indicator (RSSI) as an indicator, with the other fixed handover parameters such as handover threshold and handover margin. In this paper, a fuzzy logic based self-adaptive handover (FuzSAHO) algorithm is introduced. The proposed algorithm is derived from the self-adaptive handover parameters to overcome the mobile WiMAX ping-pong handover and handover delay issues. Hence, the proposed FuzSAHO is initiated to check whether a handover is necessary or not which depends on its fuzzy logic stage. The proposed FuzSAHO algorithm will first self-adapt the handover parameters based on a set of multiple criteria, which includes the RSSI and MS velocity. Then the handover decision will be executed according to the handover parameter values. Simulation results show that the proposed FuzSAHO algorithm reduces the number of ping-pong handover and its delay. When compared with RSSI based handover algorithm and mobility improved handover (MIHO) algorithm, respectively, FuzSAHO reduces the number of handovers by 12.5 and 7.5 %, respectively, when the MS velocity is <17 m/s. In term of handover delay, the proposed FuzSAHO algorithm shows an improvement of 27.8 and 8 % as compared to both conventional and MIHO algorithms, respectively. Thus, the proposed multi-criteria with fuzzy logic based self-adaptive handover algorithm called FuzSAHO, outperforms both conventional and MIHO handover algorithms.

Keyword: Mobile WiMAX; Handover; Multi-criteria decision; Fuzzy logic; Self-adaptation