A buffering mechanism for IP mobility support in 6LoWPAN-WSN under critical environment

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Abstract: With the advent of internet of things (IoT), IP mobility has become an inexorable service to wireless sensor networks (WSN). Existing mobility support protocols suffer extra packet loss due to conventional mobility operations, hence are not applicable to critical mobile applications. Therefore, this paper proposes a packet buffering mechanism (PBM) to reduce extra packet loss occur during Layer 2 (L2) mobility. In the mechanism, hand-off (HO) is anticipated and triggered before the actual movement of the mobile node (MN) and domain gateway routers assisting mobility will buffer packets for the MN during L2 mobility when the MN is not able to hear from any of the access networks (ANs). The advance HO initiation leads to Layer 3 (L3) HO before L2, thus eliminating L2 channel scanning process. The evaluation of proposed PBM shows improvements against existing solutions with HO-delay of 15ms and average packet loss of 2–4%.

Keywords: IP mobility; PMIPv6; handover; handoff delay; host-based protocols; network-based protocols; packet-loss; signalling cost; 6LoWPAN; internet of things; IoT; received signal strength; RSS; mobility speed; critical environment.

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1 Introduction

With the dawn of internet of things (IoT) (Montavont et al., 2014) and machine to machine communication (M2M) (Singh et al., 2013), WSN has got considerable importance. Their connectivity to internet has become first choice of researchers. Numerous sensor nodes are addressable using internet protocol version 6 (IPv6) [RFC 4291]. IPv6 over low power wireless personal area network (6LoWPAN) [RFC 4919] facilitate their connectivity with IPv6 networks. The nodes under wireless sensor network (WSN) domain are either static or mobile, based on their application and deployment perception. If deployed with communication perspective, a seamless communication support with efficient mobility management protocol is required to track their mobility. Existing mobility protocols suffer extra HO-delay and packet-loss due to conventional mobility operations including exchange of router solicitation (Rtr_Sol), router advertisement (Rtr_Adv), binding update (BU) and binding acknowledgement (BAck) messages. Also the connection break during Layer 2 (L2) mobility incurs extra packet-loss which can result in loss of useful information in some critical environment. Therefore, it is