Privacy Key Management Protocols and Their Analysis in Mobile Multihop Relay WiMAX Network

Mobile multihop relay (MMR) Worldwide Interoperability for Microwave Access (WiMAX) networks support multihop communication to increase wireless coverage and provide lower backhaul deployment cost with high throughput. Due to lack of physical infrastructure, MMR WiMAX network is vulnerable to several MAC and PHY layers attacks. Several articles have been published to deal with the flaws in WiMAX security. However, the official draft of IEEE 802.16-2009 (OD-2009) revision doesn't resolve all the discovered problems and additional issues still remain. In this chapter, we focused only MAC layer attacks and especially Denial of Service (DoS), Replay attack, Man-in-the-Middle attack (M-i-t-M) and the interleaving attack. The contribution of the chapter is of threefold. First, it proposed a modified version of Privacy key management (PKM) protocol for both unilateral and mutual authentication which is termed as self organized efficient authentication and key management scheme (SEAKS) authentication protocol. Second, it provides a novel full-scale security mechanism for MMR WiMAX mesh network which is termed as SEAKS protocol. Both, SEAKS authentication protocol and SEAKS protocol ensures secure end-to-end data transmission using distributed hop-by-hop authentication and localized key management schemes. Third, a detailed performance evaluation of the proposed schemes in terms of packet delivery ratio, packet overhead, processing time and the effect of increasing number of rogue relay stations is carried out and compared with the official draft of MMR WiMAX and the SEN XU. A comprehensive discussion on the counter measures of the given attacks is illustrated along with the SEAKS authentication protocols.

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