

Security Sublayer: A Required Evolution of Wireless Security IEEE 802.16j

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Abstract—This paper investigates the fundamental and security issues of security sublayer reside at MAC layer of Wimax networks. Initially healthy overview of Wimax technology is documented followed by the weaknesses to the MAC layer and problems associated to the Wimax 802.16j. The risks and impacts are assessed according to a systematic approach. Several articles have been published to address the flaws in IEEE 802.16j Security even then enhanced version of this protocol cannot settle all the problems and additional flaws emerge. Here in particular vulnerabilities leading to the denial of service attacks on standard like regarding Reset-Command message, key sharing mechanism, water torture attacks, black hat threat etc are discussed in a precise and concise manner.

Keywords— Security Sublayer, Wimax, Dos Attacks, IEEE 802.16j, Authentication, Encryption

I. INTRODUCTION

In Wimax, The base station and subscriber station face most of the same security threats and attacks as their wired counterparts, including eavesdropping, masquerading session, hijacking, middle in man attacks, replay attacks etc. Moreover wireless network regardless of whether they belong to which family are inherently less secure than wired networks because they lack the physical infrastructure. [1]. Wireless networks represent an important example of such scenarios where capturing and forging packets are relatively easy. Attacks against networked systems are becoming more complex and powerful. IEEE 802.16j task group works on incorporating multihop relay capabilities into mobile Wimax, the change mode is highly agree with 802.16e mobile and subscriber stations, but a base station specific to 802.16j will be required for relays to operate. Standard launched a new product called Relay stations which is high cost efficient and less complex than base station with relay capabilities. RS is used to collect all traffics from different sources and relay it to a base station, there is no processing at relay station. As it's easy to install, cheaper and less complex nature, chances of introducing Rogue RS or hijacking of the session, or any sorts of attacks are much easier.

IEEE 802.16j security specifications can mainly be found within the MAC layer, security parameters within the MAC layer can be embedded in a separate layer called security sublayer. The goal is to provide access control and

confidentiality of the authentication, secure key exchange and encryption so when two parties establish a link, they are protected via a set of protocol that ensure confidentiality and unique access of the authorized parties. The unique hand shaking between the two entities, namely base stations and subscriber station is done at the MAC layer through security sublayer. [1]. MAC layer consists of three sub-layer, the first sub-layer is the service specific convergence sub-layer for mapping services to and from 802.16 Mac connections, the synchronous transfer mode (ATM) convergence layer is dedicated to ATM facilities whereas the packet convergence layer is accountable of for mapping conventions and protocols[2], the second sublayer is common part sub-layer which is the core of the standard and is tightly integrated with security sub-layer, the last sublayer is security sub-layer which lies between the MAC CPS and the PHY layer, addressing the authentication, key establishment and exchange etc between the MAC and PHY layer.[3]. This paper will address the security issues, vulnerabilities, threats and risks of IEEE 802.16j standard in a very precise and sequential manner.

II. SECURITY SUBLAYER THREATS AND SOLUTIONS

Most of the experts and professionals claiming that broadband data delivered over 3G cellular networks will choke the hope of the WiMAX industry for the standard to become worldwide significant. There are too many factors involved in weakening WiMax security, stability, Quality of service etc. A WiMax wireless access network consists of base stations and mobile stations (MSs). The base stations provide network add-on to the mobile stations. As a serving base station, a mobile station selects the one which offers the strongest signal. At this point, the subscriber plays the role of the user while a base station and a collection of served mobile stations play the role of system. In wimax most of the security issues are addressed and handled in the MAC security sub-layer as described in the figure below: After MAC common part sublayer, security sublayer starts, in common part sublayer MAC protocol data units (PDUs) are constructed, connections are established and bandwidth is managed, the common part exchanges MAC service data units (SDUs) with the convergence layer. The common part is tightly integrated with the security sublayer, the security sublayer addresses

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