A Secure Architecture for Mobility Management in Heterogeneous Networks in IMS

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Abstract

The IP Multimedia Subsystem is a basis for a significant new architecture which offers network operators the opportunity to expand their services, integrating voice and multimedia communications and delivering them into new environments with new purposes. The IMS is an overlay network on top of IP that uses SIP as the primary signaling mechanism. Using IMS bears several new security challenges. In this paper we provide an overview of IMS and its architecture. Then we represent a secure model to overcome some of IMS security challenges.

1. Introduction

The IP Multimedia Subsystem (IMS) is at the core of the next upcoming generation of telecommunication services and recently it has received a lot of attention in the industry. Developed by the 3rd Generation Partnership Project (3GPP), IMS is based on Session Initiation Protocol (SIP) signaling and the Internet Protocol (IP). The IMS architecture represents significant changes in the way that telecommunication services are implemented and deployed.

This convergence of voice and data networks beside the convergence of fixed and mobile communication is a great achievement in the communication world but the big challenge is to maintain an adequate security level in the heterogeneous network environment.

Since IMS is based on SIP and IP protocols, it has many known security threats due to these protocols. In the following chapters in this paper we'll discuss the IMS properties and architecture. Finally, we suggest a new secure architecture for IMS.

2. An overview of IMS

The IMS is being developed as the next generation networks core architecture for converged voice and data services. Initially IMS was design for 3GPP wireless; IMS has evolved to include multiple access technologies and is the basis for planned converged network services including both wireless and wired access.

The three primary goals most often cited for the IMS are Quality of Service (QoS), Charging and Billing, and Integration of Services. In short, the first two goals derive from the fact that modern networks are primarily based on the packet switched (e.g. IP) protocols which provide only a best effort service. Thus, most VoIP applications cannot provide any guarantees as to the user experience nor can they provide fine-grain charging and billing interfaces for the network provider. An important objective of the IMS standards is to create architecture for deploying VoIP applications that provides for both QoS and charging [1].

3. Why IMS?

By using open standards, IMS has a great capability in delivery of multimedia services on fixed or mobile networks. It also involves with some key issues like convergence, service production and delivery with connections between services and open standards. IMS allows the operator to either keep or change their enterprise model.

The traditional network structure with its service-unique functionality is very complex and costly to build and maintain as the number of services grows. Separate implementations of each layer must be built for every service and the structure is replicated across the network from the terminal via the core network to the other user's terminal. On the other hand, The IMS architecture provides a number of common functions that are generic in their structure and implementation, and can be reused by virtually all services in the network as shown in figure1.

In a non-IMS network, services are specified and supported by a single logical node, or set of nodes, performing special tasks for each specific service. The only possible way to interface between services is through protocols specific to each combination.

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