

# Deploying SIP-based Mobile Exam Application onto Next Generation Network testbed

Ahmed Barnawi, Nadine Akkari, Muhammad Emran, Asif Irshad Khan

Faculty of Computing and IT  
King Abdulaziz University  
Jeddah, Saudi Arabia  
ambarnawi@kau.edu.sa

*Abstract*— over the past few years, mobile operators are faced with enormous challenges. Of such challenges, evolved user demands on personalized applications. Telecommunications industry as well as research community have paid enormous attention to Next Generation Networks (NGN) to address this challenge. NGN is perceived as a sophisticated platform where both application developers and mobile operators cooperate to develop user applications with enhanced quality of experience. The objective of this paper is two folds, first we present an introduction to state-of-the-art NGN testbed to be developed at KAU, and second we provide initial analysis for deploying a mobile application on top of the testbed

*Keywords*-NGN; Testbed; SIP; mobile application;

## I. INTRODUCTION

In light of the most recent development in mobile telecommunication market, the concept of mobile application have evolved to become one of most important features in the futuristic mobile communications systems. Recent mobile personalized applications must meet anywhere/anytime/reliable demands set by users. According to standardization body, third Generation partnership Project (3GPP), Virtual Home Environment (VHE), the legacy concept of mobile applications, is defined as a system concept for personalized service portability across network boundaries and between terminals.

Next Generation Networks (NGN) plays central rule to bring together the users, operators, and application developers. From an end-user's point of view, NGN should consistently present him/her with the same personalized services whatever the network that serves him/her and whatever the terminal technology he/she uses. From applications developers' point of view, NGN offers resources and interfaces "APIs" through which the applications are deployed. And from operators' point of view, NGN is concerned with provisioning and guaranteeing end to end (e2e) Quality of Service (QoS) in the context of all-IP heterogeneous network.

The complexity of today's data communications networks necessitates complete, realistic and sophisticated testing playground for verifying and validating their functionalities. Testing in production and commercial networks is typically forbidden since they present a high degree of risk factors for

service availability. Therefore, the optimum objective for our research group is the implementation of NGN testbed to be used as a platform for next generation mobile application development.

IP Multimedia Subsystem (IMS) is considered as the cornerstone for NGN. IMS is best described as the glue between the "global" applications world (Internet) and the mobile world. The IMS was designed to make it easy for third party developers to deploy their applications over mobile networks. According to the standards, IMS is defined in the form of reference architecture to enable delivery of next-generation communication services of voice, data, video, wireless, and mobility over an Internet Protocol (IP) network [book engineering].

Signaling in IMS network is based on a Session Initiation Protocol (SIP). The SIP based architecture provides a multiservice environment with multimedia capabilities. IMS contains Home Subscriber Server (HSS), which is the central storage area for user-related information such as his/her security related information or the service to which the user is subscribed to. It also consists of the Serving Call Session Control Function (S-CSCF) which acts as the central node of the signaling plane. S-CSCF on one hand is connected to the Application Server that hosts the application and on the other it is connected to HSS and the mobile IMS either through the Proxy CSCF (P-SCSF) if the client resides in its own area of serving or Interrogator CSCF (I-SCSF) if a client is being served by another S-CSCF.

Although IMS was designed to make it easy to develop applications, good knowledge of the IMS network architecture and the underlying Internet protocols is still needed to develop IMS applications [14]. In this paper we highlight our first research findings. The first two objectives of our research project is to set up an NGN testbed and develop a mobile application on top of the testbed. The application we have chosen to develop is automatic mass production examination system. This system enables students to receive their test on their portable mobile devices.

The remainder of this paper is organized as follows. In section II, we highlight the IMS components and functionalities. In section III, we give a brief of SIP signaling.