Developing a Toolkit for Video-oriented services in the NGN environment

Zelalem S. Shibeshi1, Alfredo Terzoli2, Karen Bradshaw2
Department of Computer Science, Rhodes University
Grahamstown, South Africa
1 zelalems@rucus.ru.ac.za
2 {A.Terzoli, K.Bradshaw}@ru.ac.za

Abstract— The development of broadband and other communication network infrastructures together with the demand for converged services has led to the introduction of Next Generation Networks (NGN). Various efforts have been put forward to develop a standardized infrastructure to implement an NGN. One infrastructure that can be used to deliver a converged service is IMS (IP Multimedia Subsystem). On the other hand, the demand for video-oriented services from users is ever increasing and puts great pressure on Telco companies. While the infrastructure to provide these services has made considerable progress, service development has been unable to meet the demand so far. As a result, developing a toolkit to help developers create video-oriented services easily and timely is of paramount importance. This paper discusses the progress in developing such a toolkit.

Index Terms — IMS, SIP, Application Server, Video-oriented service, Videomail.

I. INTRODUCTION

The Telco industry is moving towards a Next Generation Network (NGN) environment as the demand from users for converged services becomes increasingly high. The current development trend of both the Internet and Telecommunication confirms that both these networks are now at a crossroads, and their common evolution is heading towards the next-generation IP-based network [1]. The traditional vertical integration of services to the associated network has hitherto prevented operators from delivering converged services. NGN, by separating the service layer, creates a platform to deliver the same type of service across different networks. Although there are many competing visions of how service delivery can be achieved in NGN, there is one framework that is currently gaining considerable momentum - the IMS framework [2].

Another service development environment that is the focus of much attention from the research community is Mobicents [3]. Currently, we are using the IMS infrastructure as a service development environment in our effort towards developing video-oriented services. This paper focuses on the infrastructure.

The major goal of IMS is to create a deployment platform for the delivery of multimedia services. Multimedia, particularly video-oriented services, such as Video On Demand and Personal Video Recording and Sharing, are already taking the lead in terms of traffic and revenue generation in the current Telecom and Internet world. According to [4], the growth of online video spending totaled $2.12 billion in 2008, up 36% from 2007 and has been forecast to continue double-digit increases through 2010. Another study also projects that worldwide mobile video service revenue will reach $35 billion by 2011 [5].

The demand for video-oriented services can be met by providing an easy to use service development toolkit, which will simplify the development effort required from developers by allowing them to concentrate more on the business logic. The toolkit will also aid in the adoption of the NGN technology and will reduce development time and cost. The next section gives a brief overview of the current service development efforts in the IMS environment.

II. RELATED WORK

A. The IMS Architecture

According to [6], the IMS architecture contains three planes: Transport (Access) Plane, Control Plane, and Application (Service) Plane. In the middle of the core infrastructure layer lies the IMS control layer, which contains the HSS (Home Subscriber Server), and the three SIP servers, that implement the Call Session Control Function (CSCF). These SIP Servers are the P-CSCF (Proxy-CSCF), the S-CSCF (Serving CSCF), and the I-CSCF (Interrogating CSCF). The HSS is the master database that contains subscription information and performs authentication and authorization functions.

B. Application Development in IMS environment

The IMS architecture is designed in such a way that based on a criterion, the initial filter criteria (iFC), it can be configured to initiate a certain Application Server (AS) that is deployed at the service layer. Currently we use the FOKUS OPEN IMS testbed [7] to develop and test IMS services. For the IMS client and AS, the various UCT (University of Cape Town) IMS components are utilized [8].

C. Video-Oriented Service Development Examples

The IMS environment has been used as a proof of concept to develop various innovative multimedia applications by various researchers around the world. Particularly, its ability to create interactive multimedia applications is discussed with examples in [9-11]. An IPTV system that integrates video calls and also demonstrates how users can initiate an online shopping based on an advertisement on IPTV is detailed in [9]. Ref [11], on the other hand, describes how to develop different types of video conferencing systems in the IMS environment. The following section describes the initial architecture identified for the purpose of video-oriented service development.

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III. INITIAL ARCHITECTURE

Traditionally, the idea of media control was left to media and application servers, but as the requirement for interactive and advanced multimedia services increases, the need for a separate and comprehensive media control unit has become evident. As a result, the specification of the IMS from the outset clearly specifies a Media Control Unit, called the Media Resource Function Controller (MRFC), which is part of the Media Resource Function (MRF), MRF, which is part of the IMS core, also includes the Media Resource Function Processor. With regard to media control protocol many opposing ideas are rolling around. However, as described in [2], the true flexibility of the media resource function will only be made possible by the adoption of SIP throughout the IMS architecture. The need for a novel media control technique is also discussed by various RFCs, including the recently proposed draft rfc [12]. However, there is no consensus as to how the MRFC and MRFP communicate to each other, except that the IMS specification specifies that h.248 be used as a controlling protocol. But, various proposals have been made in this regard including the SIP based MCML, H.248, MEGACO and the traditional MGCP. Consequently, identification of the proper MRF will be one part of our research work. Preliminary investigation into the required infrastructure for video-oriented service deployment in the NGN environment leads to Video Service AS together with a full-fledged MRG to be integrated and deployed in the IMS application layer. There could be different service specific ASs, like Video Conference AS, Videomail AS, etc, which could be put in the same system or can exist as a separate unit. Figure 1 illustrates how video-oriented service architecture can be deployed in the IMS infrastructure.

As can be seen from this figure, a Video Service AS that coordinates the different components exists at the fore-front of this architecture. Other specific purpose ASs, such as Conference Server and Videomail AS, in collaboration with the media control and delivery unit perform the actual service delivery. For the purpose of clarity, we have included the MRF as part of this architecture for the sake of clarity of the design.

IV. CURRENT PROGRESS

As an initial development investigation activity, we are developing a video mail service for the IMS environment. The video mail service can be regarded as two separate services: video message recording and video message playback. Currently, we have finalized the playback of video messages by extending the UCTIMS IPTV AS. The second part, which is under development, requires the configuration of a B2BUA AS to monitor and transfer video calls to the video message recorder. We are currently exploring the possibility of integrating UCT’s B2BUA AS as a B2BUA server for the video recording part. We are also trying to extend the IPTV AS to include a video recording module. The Gstreamer multimedia Framework is used to develop the video recording module [13]. As described previously there is no agreement with regard to the interface between the MRFC and MRFP. Accordingly, we will investigate the different possible implementation of the MRFC for the purpose of video-oriented service delivery.

V. CONCLUSION

The IMS infrastructure has made the deployment of multimedia services easy. An important class of service is based on video. A service developer will have an advantage if supplied with a development toolkit geared towards the NGN environment for developing video-oriented service. As part of the service development activity in the NGN environment, a video mail system, currently under development for use in an IMS environment, is also demonstrated.