Multimedia Session Continuity in the IMS: Investigation and Testbed Implementation

Keoikantse O.A Marungwana, Neco Ventura

{marungkoa | neco}@crg.ee.uct.ac.za

***Abstract*— Multimedia Session Continuity (MMSC) in the IMS provides the ability to maintain continuity of multimedia sessions during terminal mobility events, and facilitates session transfer across user terminals. The transfer of a multimedia IMS session between devices is complicated by the various ways in which it can be achieved. These include a full transfer of both media and signaling, full media transfer without transfer of signaling, partial media transfer in which only one of the media components is transferred to a different device, e.g. video only transfer. This research aims to investigate, in a practical IMS testbed implementation, the challenges presented by multimedia session continuity as a service in the IMS.**

***Index Terms*— Multimedia, Session Continuity, IMS**

I. INTRODUCTION

THE ability of a user to be contactable regardless of the type of network they are attached to, or which device they are currently using is a critical requirement in the envisioned all-IP IMS environment. Users should be able to move their sessions seamlessly across any preferred device or access network. This requirement is a focus area of both 3GPP [1] and IETF [2].

A session can have one or more multimedia components including voice, video, presence information, and instant messaging. This session can thus be transferred as a whole towards another device, or in part, where only some components are transferred to the other device.

The paper briefly overviews session continuity in the IMS (II), presents further details on the scenario of interest (III), outlines the testbed implementation (IV), and finally presents the evaluation framework and conclusion (V and VI).

II. MULTIMEDIA SESSION CONTINUITY IN THE IMS

Multimedia session continuity is currently in draft stages of specification. The service is implemented by an application server in the IMS. Session continuity is divided into three scenarios: 1) Session continuity between packet-switched networks, 2) Session continuity between packet-switched and circuit-switched networks, and 3) Session transfer between devices of the same user. These scenarios present many challenges, given the heterogeneous nature of Next Generation Networks and devices. The last scenario is the focus of this research, and is thus elaborated further in the following section.

III. SESSION TRANSFER BETWEEN USER DEVICES

The transfer of a multimedia session between different terminals is also referred to as session mobility. It can be performed in a number of ways. The different scenarios are presented, followed by requirements and challenges of session transfer.

A. Session Transfer Scenarios

A multimedia session can be split into separate components (voice, video, and data) which are then directed to different devices [1, 3]. In an IMS environment, the media components may be transferred to the target device, while SIP signaling remains on the original device; or both signaling and media may be transferred to the target device. Other functions include adding, retrieving, and removing session components from a target device.

B. Requirements and Challenges for Session Transfer

In the IMS, both the original and target devices need to be registered with the core to perform a session transfer. The transfer delay, as well as dropping of any packets should be minimized to avoid excessive disruption to the ongoing session. Another challenge is the synchronization of media components when they are sent to different devices. In all scenarios, the aim should be to achieve user satisfaction with the use of session transfer mechanisms.

IV. ARCHITECTURE AND TESTBED IMPLEMENTATION

The testbed environment is comprised of the FOKUS Open IMS Core [4], the UCT IMS client [5], both open source projects, and a Multimedia Session Continuity Application Server.

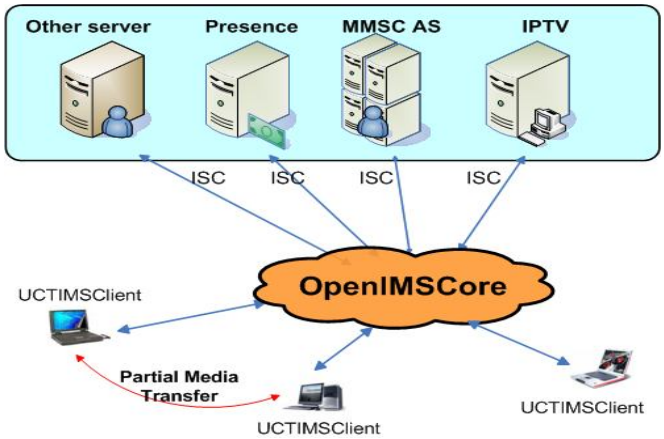

Figure 1: Testbed Environment

A. *The IMS Client*

The SIP compliant UCT IMS client is extended with multimedia session transfer functionality to transfer, add, retrieve and remove session components from a target device, which is communicating with a remote party. The client's session continuity extensions are shown in Figure 2.

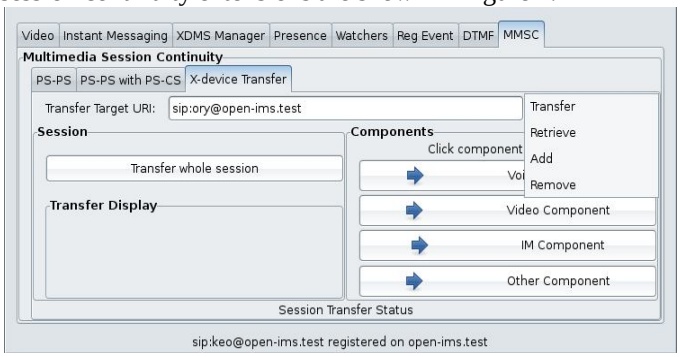

Figure 2: Session Continuity for the UCTIMSClient

B. *Multimedia Session Continuity Application Server*

The Application Server responds to and authorizes session transfer requests from clients based on a session transfer policy. The policy contains user information, the types of authorized session transfers, and user-defined preferences for session transfer such as preferred devices, preferred networks and current device in use. It subscribes to certain events such as the user's registration events and presence status information. It can therefore provide intelligent multimedia session continuity in the IMS, whereby incoming multimedia sessions are transferred to the user's current-device-in-use.

V. Evaluation Framework

Session transfer for MMSC can be implemented in two approaches, a server-based approached, and a device-based approach. These are briefly overviewed below.

A. *Server-Based Approach*

In this approach, the application server acts as a back-to-back user agent (b2bua) or performs third party call control (3pcc) [6] by inserting itself into the signaling path between the communicating parties. For media manipulation, e.g. splitting of session components for session transfer, it also sits in the media path of the multimedia session. It controls all session continuity related functions. This approach relieves client terminals of the potentially complex session transfer procedures. Also, it can be integrated with many other services, e.g. presence, device discovery, GPS, etc. to provide a fully featured and multimedia-rich IMS experience.

B. *Device-based approach*

Here there is no application server and the devices perform all session transfer related functions. All devices thus have to support this functionality. Thus, no session transfer policy can be implemented in the IMS, and the solution becomes a device capability rather than a service provided by the IMS.

C. *Analysis and Evaluation Metrics*

This research aims to investigate and compare these two approaches, with regard to the requirements and challenges briefly presented in previous sections. Quantitative indicators, such as processing overhead, SIP message overhead, transfer delays, packet loss, and synchronization of components will be investigated. Qualitative indicators such as the amount of extensions required on the UCT IMS Client and the Open IMS Core will also be investigated.

An important component of the solution will be close conformity with the developing 3GPP standard on Multimedia Session Continuity in the IMS.

VI. Conclusion

Multimedia Session Continuity is an important requirement for the multimedia-rich IMS environment. As the standard develops, evaluations must be performed to determine the challenges and benefits of this service. Practical testbed implementations, using different access networks, devices, and especially open source software tools, will form a solid reference point of departure to achieving an effective solution.

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Keoikantse O.A Marungwana obtained his BSc (Eng) Electrical degree from the University of Cape Town and is currently doing his MSc degree in Electrical Engineering. His research interests are IP Multimedia Subsystems and Mobility Management.