Chapter 15
Targeted Mobile Advertisement in the IP Multimedia Subsystem

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ABSTRACT
This chapter provides an overview on targeted advertisement in the IP Multimedia Subsystem (IMS). A new entity called Personalization and Advertisement Insertion Logic (PAIL) is introduced, which enables a mobile network operator to exploit contextual data stored in its network for personalized advertisement selection. PAIL combines location information with user profile information in order to select the best match from a pool of advertisement clips. This selection is based on the Vector Space Model. For the evaluation of this framework a series of tests with users were executed. These tests show that using contextual information from the IMS network a subjective better match of advertisement clips with user interests is achievable.

INTRODUCTION
In traditional media such as print media, television or radio, advertisement is one of the main revenue sources. With the rise of the Internet in the recent decades, a new form of media has been established that also relies on advertisement as one of its core revenue sources. Compared to traditional media, where advertisements are mostly focused on a specific target group and less to a certain viewer or listener with his or her individual preferences, the Internet allows for a much more targeted i.e. personalized advertisement presentation. Due to increasing bandwidth in mobile networks, the availability of smartphones with higher display resolutions and thus the increasing popularity
of the mobile Internet, mobile advertisement is gaining more and more importance. In the case of mobile advertisement, targeted advertisement is even more evident e.g. using the location of a user for a better advertisement selection. Thus the provision of contextual data like location is of high relevance. In mobile networks, a transition towards Next Generation Networks (NGN) is currently happening. The most prominent example for NGN is the IP Multimedia Subsystem (IMS) that is under standardization by 3GPP.

The problem, this chapter is investigating, is how can a network operator leverage intrinsic subscriber information, for instance the subscriber’s position or the fashion a subscriber uses the operator’s network, in order to provide more meaningful, more relevant advertisements to that subscriber. More specifically, this chapter studies targeted mobile advertising with an application to the IMS, due to its prominence.

This chapter is organized in the following fashion: First of all an overview is provided on mobile advertisement concepts along with an introduction to IMS. Moreover, a solution framework for targeted advertisement in IMS is presented. Later on, a new entity is introduced, the Personalization and Advertisement Insertion Logic (PAIL), which is the core component of the proposed targeted advertisement solution and is presented in detail. Part of the PAIL is the advertisement selection algorithm that is based on a Vector Space Model (VSM). Finally, an evaluation of the advertisement selection is presented which includes user tests.

**BACKGROUND**

**A. Methods of Modern Advertisement**

As the advent of Web 2.0 progresses, a new realm of services is spawned; a realm that allows for the application of novel business models that incorporate rich-context based information. A predominant source of such context-based information is the direct access that telephony network operators have to their subscribers’ personal data. In networks like the IMS, a lot of context data is available today but its potential is not fully used. The momentum on the operator side to exploit this informational wealth is increasing though, manifested in the establishment of lobby groups such as the Subscriber Profile User Group (2009). The exploitation of context data, together with the trusted-provider status in the value chain and the established business and charging relation is a huge potential for establishing business in the new field of personalized advertising; a field that is currently dominated by web companies like Google or Yahoo. Business opportunities enabled by personalized advertisements have gained a lot of attention. Recently a market research in Germany regarding Content Delivery Platforms (2008) revealed that targeted mobile advertisements lead to a response rate of 3.4%, meaning that 34 out of 1000 users e.g. click on a banner displayed to them. Compared to other forms of direct marketing this figure is extremely high, and consequently 74% of the advertisement companies see their expectations of this form of advertisement matched or even exceeded. From the user’s point of view, according to the study, users are much more likely to appreciate this new form of advertisement when the content displayed to them actually suits their personal taste and needs. This places the mobile operators into a strong position, because the high response rate and the better customer acceptance leads to a significantly higher price for the cost per thousand impressions (CPM) they can charge to the advertisement companies.

The goal of targeted advertising is to deliver to a user, a set of advertisements for products that the user is actually interested in. The realization of this goal strongly depends on the available information. One can define the following categories of targeting:

- **Behavioral targeting:** Based on e.g. the user’s web-browsing behavior