

# Shopping Assistant

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**Abstract.** This paper presents the Shopping Assistant, the prototype of a platform which provides personalized advertisements, ontology based product recommendations and user support to find a (non-web) store selling desired products. The benefits are satisfied consumers, better advertising revenues and fine grained TV usage statistics which enable broadcasters to provide a more user centric program composition.

**Keywords:** personalized advertisement, location based services (LBS).

## 1 Introduction

In todays media, advertisements have become an omnipresent part which is not uncommonly considered as very annoying. While technical advances make it easier to skip commercials, broadcasters try to prohibit that by means of technical restrictions. Instead of trying to force customers to see commercials, the Shopping Assistant – developed by SES ASTRA TechCom, Inverto and CRP Henri Tudor in the scope of the ITEA 2 WellCom Project [2] – aims at making advertisements more interesting and valuable for customers by offering personalized advertisements. This is a long-needed feature of marketing experts and many other global players are going the same direction (e.g. Google [1]).

The Shopping Assistant can be subdivided into two parts that differ in time and place. These parts, the Home-Fraction and the Shopping-Fraction, are briefly described in section 2 and 3.

## 2 Home-Fraction

The Home-Fraction assumes the following environment: TV, *Set-Top-Box*<sup>1</sup> (STB), WiFi capable mobile phone, a WiFi access point and a permanent internet connection. A new development is the *Home Gateway* (HGW), which is running an HTTP-Server on a Linux OS, providing an NFS share and an event notification interface listening for UDP packets. The HGW is a seperate device in this prototype but is proposed to be integrated into the STB later. All devices except of the TV are interconnected via WiFi or Ethernet and form the home network.

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<sup>1</sup> Assembled by Inverto.

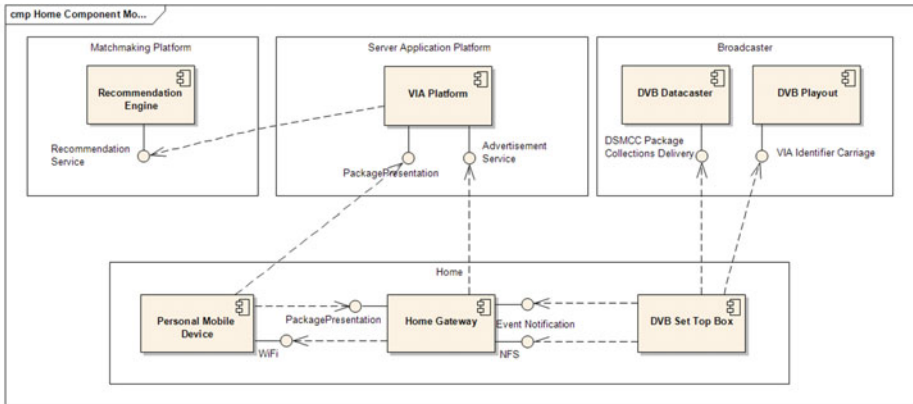


Fig. 1. Component model for the Shopping-Assistant

The following steps form the Home-Fraction:

## 2.1 Ad-Package Distribution and Identification

The registered user in this environment can receive more fine grained advertisements (*Ad-Packages*) on his mobile phone. These Ad-Packages are bundled to Ad-Collections – which correlate to one commercial-spot each – and broadcasted in advance using a *digital storage media command and control* (DSM-CC). The STB receives and stores them on the NFS share on the HGW. Ad-Collections have a unique ID (Ad-ID). The same ID is added as a subtitle segment<sup>2</sup> to the transport stream of the corresponding commercial.

## 2.2 Ad-Package Profile Matching

The STB inspects the subtitle segment and sends the notification to the HGW, including the ID. The HGW sends a SOAP-Message via Internet to the *Video Interactive Application (VIA) Platform* – where all user profiles are stored<sup>3</sup> – including the Ad-ID and the IDs of all connected users. This returns – after consulting the *Recommendation Engine* (RE) – the ID of the Ad-Package which matches the users interests best.

<sup>2</sup> The DVB Subtitling Systems standard (ETSI EN 300 743 v010301) has provisions for including stream synchronized private data. The VIA Identifier is encoded in a private subtitling segment with the segment type 0xAD.

<sup>3</sup> The centralized data storing on the VIA Platform facilitate an easy and quick recovery after a device failure, since nothing but the login credentials are stored on the end user device.

### 2.3 Ad–Package Presentation

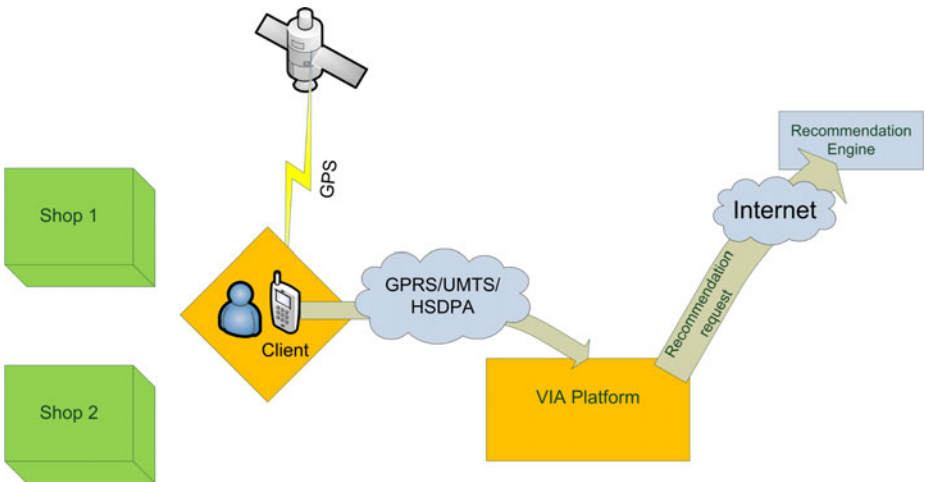
According to this return values, the HGW prepares the correct Ad–Package for each user as a website on its HTTP–Server. Each user is offered the choice whether he is interested in this product or not.

### 2.4 Input Processing and Profile Enhancement

The input is sent to the VIA Platform and added to his profile. This enables an increasing precision in the selection of the best Ad–Package. The information that reaches the VIA Platform facilitate user acceptance statistics, that can be used to enhance the general design of commercials.

## 3 Shopping–Fraction

The user on the move must have the Shopping–Fraction application running on his mobile device in order to use the service. This application is implemented using JavaME. Its functions are to submit the users position<sup>4</sup> in individually predefined intervals to the VIA Platform and to listen for replies from the VIA Platform containing shop and product information. On reception of a position update of a certain user, the VIA Platform generates a list of shops nearby that are selling products the user stated his interest in (see Shopping–Fraction in section 3). This is achieved by simple database requests, which select all shops whose euclidian distance to the user’s position is less than a certain value



**Fig. 2.** Data exchange in the Shopping–Fraction

<sup>4</sup> The current position is determined using GPS.

(depending on the density of shops in the area) AND which are selling products that are in the user's interest-list. The interest-list is also the result of a database request. In this prototype, the VIA Platform only sends the user profile and the interest-list containing product profiles to the Recommendation Engine. Product profiles are given as OWL files. The corresponding ontologies have been designed by CRP Henri tudor. The request uses the same web service that has been used for Ad-Package recommendations described in section 2. This is proposed to be enhanced in future implementations as shown in section 4. At the time given, the return value from the RE contains the ID of the product that the user – according to his profile – is supposed to desire most. The VIA Platform selects the closest shop that is selling this product and sends the information to the user's mobile phone, where an alert is raised.

## 4 Future Prospects

The aim is to provide a closed system, where the final buying decision is recognized and used to enhance user profiles and future product recommendations automatically. As mentioned in the preceding section, some enhancements are proposed concerning the Shopping-Fraction. A new web service is to be implemented, which takes list of products, lists of shops and a user profile including his current position. This will enable more complex calculations and better recommendations (e.g. return one shop which sells most of the products the user desires, considering also the distance to the user).

In this context a lot of user data like interests, desires and current location is exchanged, which is highly confidential information. Even if security has always been taken into account during the design and implementation of the Shopping Assistant, this has to be reviewed before it can be officially launched. To achieve the best security and privacy, existing and sophisticated techniques to provide security will be employed and all user data will be anonymized whenever it is communicated.

Another aspect is a completely new advertising paradigm, where Ad-Packages are injected directly into the transport stream of movies whenever they fit to the content and the users desires and only when they fit.

Finally, social networking functionality should be integrated, to enable suggestions for gifts for the upcoming birthday of a friend as well as collaborative filtering for the best possible product recommendations.

## References

1. Wojcicki, S.: (VP, Google Product Management): Making ads more interesting (2009)
2. ITEA 2 WellCom Project, <http://www.itea-wellcom.org>