Towards a New User Experience in IPTV: Convergence Services and Simpler E-commerce on IMS-based IPTV

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Abstract

Telecommunication incumbents regard IPTV as a key service differentiator to reduce customer churn and generate new revenue streams. However, as more operators deploy this service, the factors for differentiation are dissolving rapidly. In this paper we present how IPTV can be enriched by integrating telecommunications services. We also show how new collaborative business models can be created by bringing Identity Management in the IPTV domain. Furthermore, we address privacy aspects for IPTV service portfolios - a topic which is crucial to gain user acceptance for new services. This paper also details the architecture of the prototype system deployed and based on IMS.

Keywords

IPTV, business models, identity management, IP-Multimedia Subsystem (IMS) telecommunication services, shared user experience

1. Introduction

Telco incumbents are recently embracing IPTV as a way to boost broadband adoption and generate new revenues. Moreover, the move to IPTV is also dictated by the need to compete with the triple play offering of cable operators.

As more operators deploy IPTV services with new features such as catch-up TV and nPVR, the factors for differentiation are dissolving rapidly. We believe that further differentiation is possible by focusing on the integration with communication services in order to create a new "shared" viewing experience. Moreover, collaboration with 3rd Party Service Providers will also be crucial to create service differentiation. This paper shows how Identity Management (IdM) technologies can be conjugated with IPTV in order to support new collaborative business models and effectively address the privacy aspects raised by collaborations with 3rd Party Service Providers.

This research is based on an IMS-based IPTV platform, as it provides a common control layer for the future Next Generation Networks (NGN) [4] and allows easy service composition.

2. Use Cases

2.1 Shared User Experience

A new dimension in watching TV can be achieved by integrating IPTV and multimedia communication services, such as voice and video telephony. This will enable user groups like friends or family members to share their emotions meanwhile they are watching a TV program, even if they are at different locations in higher audio and video quality than with traditional end user communication equipment.

Using the TV screen and the remote control for such purposes seems difficult at first. The integrated solution must enable end users to use even complex functions like group communication (conferencing) with ease. This will stimulate the service usage and allow new technology usage forms to evolve, potentially opening new business opportunities. As telephony flat rates are widely adopted Telcos might not experience a big revenue increase from integrated communication services directly. Instead, the greater benefits will come from the "social connectivities" that these services create and therefore contribute to the customer churn reduction.

The integrated communication services are complemented by allowing users to use messaging services such as voicemail from the TV screen. For example, users can set in their user profile, that incoming calls shall be redirected automatically to their voicemail if they set their presence status to "do not disturb," and get notifications on the screen when new voicemail or other kinds of messages have been received.

2.2 Cross–Service E–Commerce

This scenario focuses on stimulating cross-service transactions through enhanced IPTV commercial advertisements

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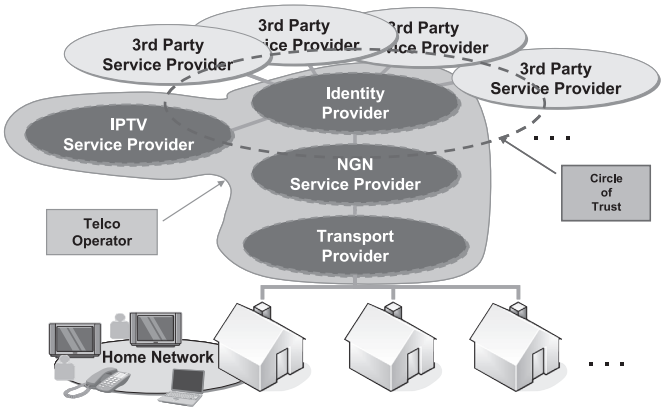

Fig. 1 IPTV circle of trust.

while maintaining user privacy. Here we consider a specific example based on the collaboration between the IPTV provider and an online DVD shop selling DVDs on the Internet.

Fig. 1 shows the business collaboration between an IPTV operator and several 3rd Party Service Providers. The trusted relationships are handled by the role of the Identity Provider (IdP), which in this specific example is the Telco itself.

When an advertisement of a DVD is played out, the end user has the option to interact with the advertisement and eventually buy the advertised DVD online at the 3rd Party DVD shop.

Upon interaction with the advertisement the user is transferred to the Internet DVD shop anonymously. If the user concludes the order of the product, the shop requires a shipping address and billing details to complete the transaction, which it requests from the IdP. While business agreements provide the fundamentals for the exchange of user information, users can still restrict the amount of personal information returned to the 3rd Party. The 3rd Party uses the returned information and prefills it in the order form. In this way users do not have to input their data through the limited TV remote control, but only confirm the order.

This use case shows that tying IPTV to Identity Management can drastically reduce the hurdle of triggering and completing e-commerce transactions, since it reduces the whole process to a few clicks on the remote control. This encourages e-commerce transactions while respecting the user's privacy and fulfilling the Service Providers' requirements for user information access, authorization and charging.

Revenue-sharing models will ensure benefits for all the parties involved and further strengthen the key role of the Telco/IPTV provider in the overall value chain.

Collaborations with 3rd Party Service Providers are essential to address the growing demand for personalized services and to enrich the Telcos' service portfolio [11] , as it has been pioneered by NTT DoCoMo with the i-mode [7] service model.

3. Architecture

3.1 ETSI–TISPAN IMS–based IPTV

The ETSI TISPAN IMS-based IPTV architecture [1)-3)] as depicted in **Fig. 2** , has been considered as the basis for our research. It provides a basic framework for IPTV core technologies by defining functional entities in the network and the protocols to be used between the network components and the user equipment (UE) like IPTV set-top-boxes (STB).

Being an IMS based system, it already supports user authentication and service composition. SIP Application Servers (AS) such as Voice Mail AS, can be attached to the core system via the defined interfaces. This allows Telcos to customize their IMS based core infrastructure and differentiate themselves by offering unique services. The available services can be discovered by the UE through the Service Discovery Function (SDF).

3.2 IPTV and Communication Services

The core IMS system supports IP based multimedia communication services and presence services out of the box.

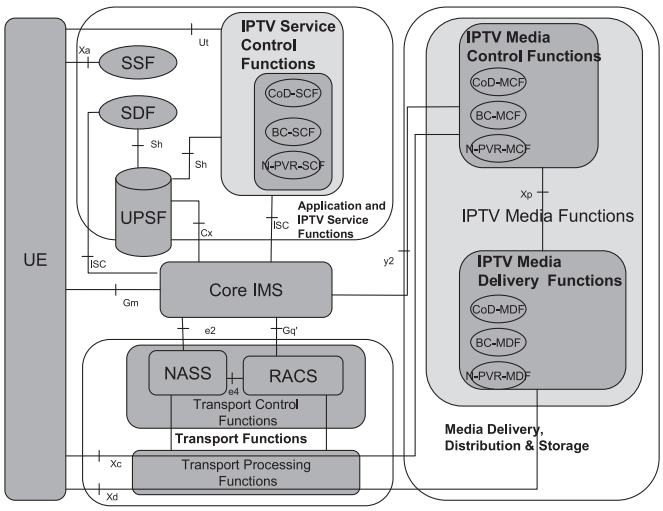

Fig. 2 ETSI TISPAN IMS-based IPTV architecture.

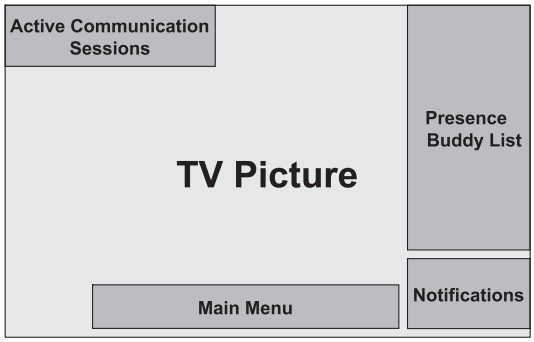

Fig. 3 TV screen UI areas.

However, in order to support use cases as described in Section 2, additional application servers and functions were added to the system, which are explained below.

- Group communication functionality is provided by a Media Resource Function (MRF) that supports conferencing. It implements server based media mixing and conference session control using SIP according to 13) - 15).
- A Call Forwarding AS monitors incoming calls targeted at users and has the capability of redirecting the calls to alternative destinations based on the user's presence status and the associated redirection rule [12] . As opposed to client side call redirection, this permits redirecting calls to voicemail even if the STB is switched off.
- The Voice Mail AS accepts redirected calls for a user and records the media stream, which can be downloaded later via HTTP for playback on the STB. Voicemail status notifications from the AS to the STB are carried out according to 16).

The integration of IPTV and communication services was performed on the STB, as it allows for flexible user interface design. We approached the integration in two steps. First, areas on the TV screen were defined as shown in **Fig. 3** to permit display of graphical user interface objects on the screen in a non-disturbing way, so that the TV experience itself is not degraded.

Next, we chose the presence buddy list as a key triggering point for initiating multimedia communication sessions with other users. Ongoing communication sessions are displayed on the TV screen in a non-intrusive way. Compared to traditional conferencing solutions our solution makes group communication management functions easy to use for end users, even with a standard TV remote control, because of the intensive utilization of graphical objects on the TV screen.

3.3 IMS and Identity Management

Every service needs a mean to identify its users, and usually different systems define their own scheme for identification, resulting in a fragmented user identity among the various accounts. Identity Management (IdM) systems address such problems by allowing users to authenticate once and be recognized at the various services they are subscribed to. Solutions such as OpenID [10] and Cardspace [9] have permeated the Web 2.0 space, while Liberty Alliance [8] has been adopted by Telco operators and the enterprise market.

The main concern of IdM systems is keeping the user's privacy. The multiple accounts owned by a user are managed by a trusted Identity Provider (IdP), that provides signed assertions to federated services. These assertions can contain the user's identity and personal data from the user profile. Each service is given a unique identifier for the user (a pseudonym), thus preventing services from tracing or linking the user's activity.

We deployed a SAML 2.0 [6] IdP and integrated it with IMS by utilizing the 3GPP Generic Bootstrapping Architecture (GBA) [5] . After a successful IMS authentication, the Network Application Function (NAF) notifies the IdP that it authenticated a user. The IdP creates a new Authentication Context and replies with a Session Token bound to that context, which is sent to the STB by the NAF. The STB stores the Session Token as a cookie for the integrated Web Browser, so that the user will be automatically recognized by the IdP using this cookie, allowing it to assert the user's identity to 3rd party services. This interaction is not specified in 3GPP standards but is mentioned as an "application specific protocol." We developed an extension to SAML 2.0 that allows a trusted 3rd party to register Authentication Contexts at the IdP.

3.4 Identity Management and IPTV

3rd party services, such as the DVD shop described in Section 2, use SAML's AuthnRequest procedure to obtain a pseudonym for the user from the IdP. This pseudonym can be used to query data from the user's personal profile, such as address and billing options. Since all these interactions are executed over the STB's Web Browser using HTTP redirections, the IdP can interact with the user and request explicit authorization to provide the data being queried. In the end, the DVD shop obtains the required data from a trusted source and the user completes the transaction in a seamless and secure way, without having to authenticate to 3rd parties or input his per-

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sonal data.

4. Conclusion

IMS and an IMS-based IPTV system has been utilized to build the prototype system used to demonstrate the technologies and use cases described in this paper. We showed how IPTV service differentiation could be achieved by integrating communication services and broaden the service portfolio by collaborations with 3rd Party Service Providers using Identity Management Technologies and IMS. Such service differentiations will be crucial for the acceptance and success of IPTV deployments and to avoid price erosion. The two presented use cases are examples of how the traditional TV experience is evolving into a new interactive lean-forward experience.

References

1) ETSI TS 182 027 v2.0.0: IPTV Architecture; IPTV functions supported by the IMS Subsystem.
2) ETSI TS 182 028 v2.0.0: IPTV Architecture; Dedicated Subsystem for IPTV functions.
3) ETSI TS 185 009 v2.0.0: Architecture and interfaces of a customer network device for IMS based IPTV services.
4) ETSI ES 282 001 V2.0.0: NGN Functional Architecture; Overall architecture.
5) 3GPP TS 33.220, V8.2.0: Generic Authentication Architecture; Generic bootstrapping architecture (Release 8).
6) OASIS SAML V2.0 Specifications.
7) http://www.nttdocomo.com/services/imode/index.html
8) Liberty Alliance ID-FF 2.0 Specifications.
9) Microsoft Cardspace, Microsoft Developer Network (MSDN), http://msdn.microsoft.com/CardSpace
10) The OpenID Foundation, OpenID Specifications.
11) IBM Global Business Services, Telecom switches emphasis - Preliminary analysis of the 2007 Telecom Industry Survey.
12) IETF draft-tschofenig-sipping-spit-policy-03.
13) RFC 4353 - A Framework for Conferencing with SIP.
14) RFC 4575 - A SIP Event Package for Conference State.
15) RFC 4579 - SIP Call Control - Conferencing for User Agents.
16) RFC 3842 - Message Summary and Message Waiting Indication Event Package for SIP.

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