

COMPOSE – an Open Marketplace for the Internet of Services

Workshop:

[WEB&PAYMENT]

How do you want to pay?

W3C WORKSHOP

24-25 March 2014, Paris, France

<http://www.w3.org/2013/10/payments/Overview.html>

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Abstract

The COMPOSE project aims at unleashing the full potential harboured by the Internet of Things by creating a complete ecosystem around it to enable the flourishing of a resulting Internet of Services, by seamlessly integrating real and virtual worlds. COMPOSE will achieve this through the provisioning of an open and scalable marketplace infrastructure, in which physical objects are associated to services that can be traded, shared and integrated in a standardized way to easily and quickly build innovative applications. COMPOSE will support open payment solutions to facilitate seamless transactions across multiple devices and stakeholders by adapting the concept of a virtual wallet in the Web browser. This is reflected in the integration of existing payment solutions in one unified infrastructure based on APIs for payment requests to a wallet and between the wallet and the payment solution provider. Fraunhofer Institute for Open Communication Systems FOKUS and W3C are partners of the EU funded FP7 project COMPOSE. Both are working on scenarios for a unified marketplace for services. COMPOSE will contribute open payment scenarios and the concept of a virtual wallet for the Internet of Services to the workshop.¹

Introduction

The Internet of Things has a huge potential to fundamentally alter the way in which we interact with the world around us, and pave the way for a brand new kind of services that will escort us wherever we turn. Nevertheless, this potential has not yet been realized due to the current complexity faced by potential exploiters. The level of complexity stems from the absence of several important building blocks. The current state-of-the-art forces potential service providers to deal with the entire hardware and software stack required realizing such services. The effort needed starts from the communication with a heterogeneous set of "things", through the creation of specific services and possibly the composition of several such services, through service deployment, adequate run-time and communication support, including non functional requirements such as reliability, while maintaining adequate levels of security and privacy throughout the different layers. And last but not least, the support of open payment solutions in the Web browser for trading these services across multiple devices and stakeholders.

It is our aim, in COMPOSE, to create an ecosystem for unleashing the power of the Internet of Things via an easy transformation to an Internet of Services. We strive to produce a complete ecosystem to be used by different kinds of stakeholders, namely, "things", service creators, infrastructure providers, and end users. We aim to lower the barrier of entry to this market, thus opening the door for different kinds of players to participate, each according to its own expertise. For example, SMEs and individual entrepreneurs will be able to produce innovative services to the mass market, while large enterprises will provide the basic infrastructure, and end-users will benefit from services that were previously economically unfeasible. The end result we envision is an open market of services for the Internet of Things.

¹ This research has been partially supported by the EU under the ICT Collaborative Project COMPOSE (Collaborative Open Market to Place Objects at your Service), grant agreement n. FP7- 317862

The following section will outline the concept of an open marketplace for the Internet of Services by elaborating scenarios for trading services between various stakeholders. This will result in standardized payment solutions for the Web browser to improve the user experience and to overcome the fragmentation of too many different payment solutions.

The Open Marketplace

Marketplaces and app stores have become the new rage in this evolving world of technology and lifestyle, with the development of leading apps stores and touch screen devices becoming essential tools in everyday life. According to Gartner, mobile app stores will see annual downloads reach 102 billion in 2013, up from 64 billion in 2012 and indicates continued strong demand for mobile app content. Furthermore Gartner expects to see more new entrants to the market, aiming to deepen relationships with their customers and/or to capture some of this growth market.

Especially in this diverse environment COMPOSE will enhance the state-of-the-art in app stores for native applications by providing an environment in which not only applications but also physical objects and their associated services can be traded. COMPOSE promotes a novel concept of trading these services by sharing their interfaces between 3rd party applications which are able to run in the context of other users who are not the owners of the service itself. COMPOSE will provide software components for managing the access rights for each service connected to the marketplace and will give the owner of the service full control to monitor the history of each application that accesses the service and to update the associated rights and rules for accessing the service at any time. Furthermore, COMPOSE will enable the information stemming from such services to be integrated into software components, and physically objects to be dynamically controlled by services actuating on them. The COMPOSE open marketplace is then expected to contribute to the creation of a new generation of app stores that will enable developers to create services interacting with, and acting on, the real world through leveraging services for physically objects.

Open Payment Solution for the Internet of Services

COMPOSE will not follow current payment solutions of proprietary marketplaces (Apple App Store, Google Play Store, etc). Furthermore, COMPOSE will investigate and develop open payment solutions for trading physical objects and their associated services. The open marketplace serves a broad range of target groups that are involved in payment transactions. We have providers who are running physical objects and their associated services. On this basis we have developers who are interested in integrating these services in their own applications. Finally, COMPOSE addresses end-user who will benefit from the offered applications. Between all these stakeholders we will find payments for the usage of services, applications and provided capabilities. We also have payments relating to advertisements embedded within applications and services (for the latter consider ads in audio and video streams).

This broad range of target groups results in following requirements for an open payment solution: (i) end-users can have many different kinds of devices, (ii) payments could be in different currencies, (iii) payments could be across international borders and (iv) outright payment, per use payment, subscription payments. A further consideration is that in principle, there could be federated marketplaces than a single marketplace. This means that services could span marketplaces by different companies and

organizations. Using open payment standards would allow an end-user or service provider on one marketplace to pay a service provider on another marketplace. COMPOSE provides scenarios where the end-user or service provider need to authorize payments in advance subject to reasonable conditions, e.g. for per use payments. COMPOSE will contribute the range of scenarios arising from the above to the workshop.

Virtual Wallet in the Web browser

The open marketplace will support a virtual wallet in the Web browser as intermediary between payment requests and payment solution providers. The virtual wallet will enable payment capabilities for service providers, developers and end-users in the Web browser. This in turn leads to one unified infrastructure by integrating existing payment solutions. Therefore standardized payment APIs are required for enabling an interoperable end-to-end payment solution. This would include the support of an API for a payment request to the virtual wallet, and another API between the virtual wallet and the payment solution provider. A unified payment API can overcome the fragmentation of too many payment solutions to avoid this burdening the developers or limiting users freedom of choice.

Virtual wallets could be installed in a user's device, or reside in the cloud or some combination of the two. Users are likely to want the same virtual wallet across all of their devices. Therefore some kind of authentication and synchronization is important, and easy to do with cloud-based solutions. Any solution should consider how to safeguard users when a given device has been lost or compromised. This is easy to do if each device has its own public key pair for authentication to the wallet. Large single or aggregate payments can require stronger proof of the user's presence. The wallet should be able to present only the payment solutions applicable to the current transaction, and furthermore to show the transaction fee applicable to each such payment solution. Users may also want to see further information that is pertinent to their decision as to which payment solution to use for this transaction, e.g. the balance of each account. In close collaboration with the development of an open marketplace COMPOSE will explore the outlined capabilities of a virtual wallet in the Web browser. Together with the before mentioned scenarios COMPOSE will contribute the concept of a virtual wallet to the workshop.