An XML based Single Sign-On Scheme for Multimedia Device Control in the Ubiquitous Home Network

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Abstract. A single sign-on scheme is proposed to obtain user authentication and control a remote device through a mobile terminal in a home network running the OSGi (Open Service Gateway Initiative) service platform based on SAML (Security Assertion Markup Language). Single sign-on profile is defined to overcome the handicap of the low computing and memory capability of the mobile terminal and automated user authentication is applied to control a remote multimedia device in a home network based on the OSGi.

Keywords: single sign-on, SAML, home network, OSGi, device control

1 Introduction

In the OSGi service platform, every service bundle in the gateway operator requires user authentication. The main security problem with a home network environment based-on the OSGi service platform is that the security infrastructure is distributed and these architectures usually require that key security features be built into all parts of the system. In addition, a user must memorize usernames and passwords for each service. SSO (Single Sign-On) is a good alternative to solve these problems. SSO is a security feature that allows a user to log into the many different services offered by the distributed systems while only needing to provide authentication once, or at least always in the same way [1].

2 Background

Release 4 of the OSGi service platform defines a "User Admin Service" but only offers authentication for each service unit [2]. SSO can be implemented by exchanging and reusing a user's authentication information, including the fact that the

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user has previously been authenticated by a specific method among different security domains. We specified the information in a uniform and unified way based on SAML.

In order to apply the SSO scheme to the home network, the services extended from core services provided by the OSGi framework should be developed and deployed onto the OSGi framework [3]. Figure 1 shows core services provided by the OSGi framework and extended services which we constructed.

![Fig. 1. OSGi framework and extended services](image)

SAML is an XML-based standard framework designed to offer single sign-on for both automatic and manual interactions between systems. SAML defines the request-response protocol by which systems accept or reject subjects based on assertions [4]. An assertion includes the statements generated by the SAML authority, conveying them and verifying that they are true. SAML defines three types of assertions: Authentication Assertion, Attribute Assertion, Authorization Assertion.

3. Single Sign-On architecture for mobile and home network service environment

![Fig. 2. Proposed Single Sign-On Scheme](image)
The concept of the proposed Single Sign-On architecture is shown in Figure 2, in which the OSGi delivers certain services offered by service providers to the end user regardless of the system environments. In our implementation, a mobile user gains access to services being managed by a gateway operator with the SAML-based information related to his own authentication in order to control a remote camera and projector. A mobile user keys in his username and password to a mobile device in order to access the Camera Control Service in the gateway operator of the Wide Area Network. This user credential information is transferred to the SSO Service through the gateway operator, which connects the mobile device and Wide Area Network.

The user authentication procedure for the architecture is presented in the form of a sequence diagram in Figure 3, where each box in the diagram denotes an entity involved in this process. Figure 3 explains the messages between entities applying a user's single sign-on among services, in which there are mutual trust relationships.

![Sequence Diagram of the Proposed Single Sign-on Architecture](image)

**Fig. 3. Sequence Diagram of the Proposed Single Sign-on Architecture**

**References**

3. OSGi Alliance Std., OSGi Service Platform Release 4.3, OSGi Alliance, (2011)