JSXC: Adding Encrypted Chat with 3 Lines of Code

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Abstract—If it isn’t on the web, it doesn’t exist. However, most of our current arsenal of web services are provided for free by large international corporations – free as in targeted advertising. More privacy-aware self-hosted alternatives frequently lack the feature set of their commercial rivals, leaving users to decide between privacy and functionality. Therefore, we present WISEchat (Web-Integrated Secure Enhanced Chat), our concept for enhancing practical security for web-based chat, as well as an implementation, the JavaScript XMPP Client (JSXC). By design, JSXC can be easily and painlessly integrated into existing webapps to equip them with encrypted chat capabilities, making them more attractive and thus more frequently providing a secure alternative as the most functional and convenient alternative.

I. RELATED WORK

There are plenty of web- or browser-based chat clients. The most widely used one is presumably the one integrated in the Facebook social network; however this client is firmly tied into its intended service, and provides an equivalent level of privacy – while the connection to the server is secured by TLS, it critically provides no security whatsoever against the server. In stark contrast to Facebook’s automatic logging of chat messages, Off-the-Record messaging [1] provides end-to-end encryption and confidentiality with full forward security, preventing even a malicious or compromised chat server from reading or altering messages in transit. This is clearly a highly desirable feature for any chat client that is to be integrated into services offering privacy by design.

Crypto Cat [2] appears to be the first popular add-on that provided an in-browser OTR-encrypted chat. As an add-on, it can profit from the full security of a native application running on a properly secured host, but requires explicit installation by the user which, for many use cases, is a crucial step too much. WISEchat removes this step by integrating directly into the web application itself, with minimal changes to the host application – generally 3 to 5 lines, depending on the degree of integration. What sets it apart from other integrable clients such as Candy [3] or Jappix Mini [4] is its set of features and its focus on security. Like Converse.js [5], it can piggy-back the authentication of the host web application, saving the user another annoying login, and tearing down one further barrier between the user and encrypted chat.

II. IMPROVING PRACTICAL SECURITY

To avoid these barriers for the user, WISEchat is designed not as another web service, but as an open-source, XMPP-based end-to-end encrypted chat client that can be easily integrated into existing web applications with minimal effort. Its integrated nature means that there is no WISEchat server or website. It is part of whatever services it is integrated with; it is, to a certain degree, invisible. This improves upon existing, standalone Off-the-Record chat applications by providing security by usability – by offering the secure alternative as the most convenient alternative, directly in the webapp the user actually wants to use at the moment, without forcing a media break.

WISEchat is a concept; JSXC [6] is an implementation of WISEchat, employing widely used, highly interoperable protocols – by using standard Off-the-Record encryption [7] compatible among implementations, by using the Extensible Messaging and Presence Protocol [8] over BOSH [9], or by employing SRTP [10] for encrypted video chat. For the user, this interoperability means that (s)he can chat with any other XMPP user, regardless of the other user’s choice of client or XMPP server.2 This makes JSXC a first-class citizen among OTR-capable XMPP clients; the user might use JSXC integrated into an open-source groupware suite like SOGo [11] while reading email in the webmail interface, but prefer to chat using a standalone chat client like Pidgin [12] with its OTR plugin while in the office. The user thus keeps his/her freedom of choice, and can use whichever client (s)he finds most convenient at any given time. Security profits because secure chat is simply the most convenient option in a greater number of situations.

JSXC is designed as an implementation of open protocols, not as a web service. In order to provide cross-platform functionality, it uses open standards like WebRTC and can thus provide video chat without plugins in most modern browsers.3 Combined with its use of common, widespread libraries for both XMPP and OTR encryption, this further reduces the burden on both the maintainer as well as the service administrator by keeping the number of components to a minimum. Because of its loose coupling (fig. 1), it also preserves the freedom of choice for the operator of the service it is integrated with. It uses XMPP towards the chat server, which can be set up using any one of a number of popular

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2XMPP, being a federated protocol, will forward messages as necessary between properly configured servers, much like Email forwarded between domains. Therefore, while generally configured with a central XMPP server for each organisation, there is no need for users to connect to the same server to be able to communicate, neither with JSXC nor with any other client.

3As of writing, Internet Explorer does unfortunately not yet support WebRTC and thus is not supported for video chat. It can of course still be used for general, OTR-encrypted text chat.

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1This is especially helpful for webmail integration, as the user’s Email address and Jabber ID are almost always identical.
what, exactly, the recipient did not fully understand. However, what could be several lengthy email round trips explaining
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of an email is currently available for chat, and may thus be
this means that the user can instantly see whether the sender
usability and integration.

XMPP server implementations – and this XMPP server itself
acts as a standalone service that can be used by other desktop,
mobile or web clients. In essence, this means that a single
real service – the XMPP server – can provide any number of
perceived services – the web chat integrated in numerous other
services – thereby greatly reducing maintenance effort.

JSXC does not have to be a separate part of the web
application that shares screen space but otherwise does not
interact with it. For example, it can automatically detect
Jabber IDs (JIDs) in the web page it is integrated on, show
the online status of the user alongside, and turn them into links to
start a chat with this user. This is implemented without active
cooperation of the host application, keeping interdependence
at a minimum without sacrificing interaction. Because JIDs
are almost universally identical to a user’s email address, this
simple functionality already provides significantly improved
usability and integration.

For example, in the SOGo integration example (fig. 2),
this means that the user can instantly see whether the sender
of an email is currently available for chat, and may thus be
able to directly ask for clarification if need arises, saving
what could be several lengthy email round trips explaining
what, exactly, the recipient did not fully understand. However,

because JSXC permits temporary, anonymous accounts, this
feature can also turn a static documentation page into a semi-
interactive medium by offering a quick, uncomplicated way of
contacting the contact persons given on the page – or of seeing
that they are offline and that an email is indeed necessary.

It does not have to be limited to such simple integration
however. For example, a federated social network application
such as buddycloud [13] could very easily provide a way
of contacting users and showing their status wherever they
are mentioned, without explicitly displaying the user’s JID. It
might then complement this by providing an easy path from
the chat window to the remote user’s profile, or provide some
form of notification of new content posted by the remote user
in the chat window. While such applications currently fall
firmly into the realm of future developments, and may require
deeper integration thus reducing JSXC’s advantages of simple
deployment into new or existing services, they clearly show
that the WISEchat concept could be used as a building block
for innovative web-based interaction.

III. DEMONSTRATION

We will demonstrate an example of a JSXC integration
into an existing webapp. From the users’ point of view, we
will demonstrate the login, unencrypted chat and starting of
an encrypted chat, while showing the messages as seen by
our “honest but curious” XMPP server. We will also show a
brief video chat conversation, but then proceed to take a look
under the hood and show what changes have been made to the
webapp, including the JSXC configuration and installation of
the BOSH proxy.

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