Use of Transport Layer Security (TLS) in the Extensible Messaging and Presence Protocol (XMPP)
draft-ietf-uta-xmpp-03

Abstract

   This document provides recommendations for the use of Transport Layer
   Security (TLS) in the Extensible Messaging and Presence Protocol
   (XMPP). This document updates RFC 6120.

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1. Introduction

   The Extensible Messaging and Presence Protocol (XMPP) [RFC6120]
   (along with its precursor, the so-called "Jabber protocol") has used
   Transport Layer Security (TLS) [RFC5246] (along with its precursor,
   Secure Sockets Layer or SSL) since 1999. Both [RFC6120] and its
   predecessor [RFC3920] provided recommendations regarding the use of
   TLS in XMPP. In order to address the evolving threat model on the
   Internet today, this document provides stronger recommendations.

      NOTE: Unless explicitly noted otherwise, all of the
      recommendations specified in [I-D.ietf-uta-tls-bcp] apply to XMPP.
      In the main, this document merely provides supplementary
      information; those who implement and deploy XMPP technologies are
      expected to follow the recommendations of [I-D.ietf-uta-tls-bcp].

   This document updates [RFC6120].

2. Terminology

   Various security-related terms are to be understood in the sense
   defined in [RFC4949].

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and
   "OPTIONAL" in this document are to be interpreted as described in
   [RFC2119].

3. Recommendations

3.1. Support for TLS

   Support for TLS (specifically, the XMPP profile of STARTTLS) is
   mandatory for XMPP implementations, as already specified in [RFC6120]
   and its predecessor [RFC3920].

   The server (i.e., the XMPP receiving entity) to which a client or
   peer server (i.e., the XMPP initiating entity) connects might not
   offer a stream feature of <starttls xmlns='urn:ietf:params:xml:ns
   :xmpp-tls'/>. Although in general this stream feature indicates that
   the server supports XMPP 1.0 and therefore supports TLS, it is
   possible that this stream feature might be stripped out by an
   attacker (see Section 2.1 of [I-D.ietf-uta-tls-attacks]). Therefore,
   the initiating entity SHOULD proceed with the stream negotiation even
   if the receiving entity does not advertise support for TLS.
   Similarly, although a receiving entity SHOULD include the
   child element to indicate that negotiation of TLS is mandatory, an
   initiating entity MUST NOT depend on receiving the flag
   in determining whether TLS will be enforced for the stream.

3.2. Compression

   XMPP supports an application-layer compression technology [XEP-0138].
   Although this XMPP extension might have slightly stronger security
   properties than TLS-layer compression (since it is enabled after SASL
   authentication, as described in [XEP-0170]), this document neither
   encourages nor discourages use of XMPP-layer compression.

3.3. Session Resumption

   Use of session IDs [RFC5246] is RECOMMENDED instead of session
   tickets [RFC5077], since XMPP does not in general use state
   management technologies such as tickets or "cookies" [RFC6265].

   In XMPP, TLS session resumption can be used in concert with the XMPP
   Stream Management extension; see [XEP-0198] for further details.

3.4. Authenticated Connections

   Both the core XMPP specification [RFC6120] and the "CertID"
   specification [RFC6125] provide recommendations and requirements for
   certificate validation in the context of authenticated connections.
   This document does not supersede those specifications. Wherever
   possible, it is best to prefer authenticated connections (along with
   SASL [RFC4422]), as already stated in the core XMPP specification
   [RFC6120]. In particular, clients MUST authenticate servers.

3.5. Unauthenticated Connections

Given the pervasiveness of passive eavesdropping, even an
unauthenticated connection might be better than an unencrypted
connection (this is similar to the "better than nothing security"
approach for IPsec [RFC5386]). In particular, because of current
deployment challenges for authenticated connections between XMPP
servers (see [I-D.ietf-xmpp-dna] and [I-D.ietf-xmpp-posh] for
details), it might be reasonable for XMPP server implementations to
accept unauthenticated connections when the Server Dialback protocol
[XEP-0220] is used for weak identity verification; this will at least
enable encryption of server-to-server connections. Unauthenticated
connections include connections negotiated using anonymous Diffie-
Hellman algorithms or using self-signed certificates, among other
scenarios.

3.6. Server Name Indication

Although there is no harm in supporting the TLS Server Name
Indication (SNI) extension [RFC6066], this is not necessary since the
same function is served in XMPP by the 'to' address of the initial
stream header as explained in Section 4.7.2 of [RFC6120].

3.7. Human Factors

It is strongly encouraged that XMPP clients provide ways for end
users (and that XMPP servers provide ways for administrators) to
complete the following tasks:

o Determine if a client-to-server or server-to-server connection is
   encrypted and authenticated.

o Determine the version of TLS used for a client-to-server or
   server-to-server connection.

o Inspect the certificate offered by an XMPP server.

o Determine the cipher suite used to encrypt a connection.

o Be warned if the certificate changes for a given server.

4. IANA Considerations

This document requests no actions of the IANA.

5. Security Considerations

The use of TLS can help limit the information available for
correlation to the network and transport layer headers as opposed to
the application layer. As typically deployed, XMPP technologies do
not leave application-layer routing data (such as XMPP 'to' and
'from' addresses) at rest on intermediate systems, since there is
only one hop between any two given XMPP servers. As a result,
encrypting all hops (sending client to sender's server, sender's
server to recipient's server, recipient's server to recipient's
client) can help to limit the amount of "metadata" that might leak.

It is possible that XMPP servers themselves might be compromised. In
that case, per-hop encryption would not protect XMPP communications,
and even end-to-end encryption of (parts of) XMPP stanza payloads
would leave addressing information and XMPP roster data in the clear.
By the same token, it is possible that XMPP clients (or the end-user
devices on which such clients are installed) could also be
compromised, leaving users utterly at the mercy of an adversary.

This document and related actions to strengthen the security of the
XMPP network are based on the assumption that XMPP servers and
clients have not been subject to widespread compromise. If this
assumption is valid, then ubiquitous use of per-hop TLS channel
encryption and more significant deployment of end-to-end object
encryption technologies will serve to protect XMPP communications to
a measurable degree, compared to the alternatives.

6. References

6.1. Normative References

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6.2. Informative References

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Appendix A. Implementation Notes

   Some governments enforce legislation prohibiting the export of strong
   cryptographic technologies. Nothing in this document ought to be
   taken as advice to violate such prohibitions.

Appendix B. Acknowledgements

   The authors would like to thank the following individuals for their
   input: Dave Cridland, Philipp Hancke, Olle Johansson, Steve Kille,
   Tobias Markmann, Matt Miller, and Rene Treffer.

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