Status of this Memo

By submitting this Internet-Draft, each author represents that any applicable patent or other IPR claims of which he or she is aware have been or will be disclosed, and any of which he or she becomes aware will be disclosed, in accordance with Section 6 of BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at http://www.ietf.org/ietf/1id-abstracts.txt.

The list of Internet-Draft Shadow Directories can be accessed at http://www.ietf.org/shadow.html.

This Internet-Draft will expire on April 24, 2006.

Copyright Notice

Copyright (C) The Internet Society (2005).

Abstract

This document specifies an extension to the Kerberos protocol where the client can send a list of supported encryption types in decreasing preference order, and the server then selects an encryption type that is supported by both the client and the server.
Table of Contents

1. Introduction ................................................. 3
2. Conventions Used in This Document .......................... 3
3. Negotiation Extension ........................................ 3
4. Security Considerations ...................................... 4
5. Acknowledgments ............................................. 5
6. IANA Considerations ......................................... 5
7. Normative References ......................................... 5
Authors’ Addresses .................................................. 6
Intellectual Property and Copyright Statements .................. 7
1. Introduction

Under the current mechanism [RFC4120], the KDC must limit the ticket session key encryption type (enctype) chosen for a given server to one it believes is supported by both the client and the server. If both the client and server understand a stronger enctype than the one selected by the KDC, they can not negotiate it. As a result, the protection of application traffic is often weaker than necessary when the server can support different sets of enctypes depending on the server application software being used.

This document specifies an extension to the Kerberos protocol to allow clients and servers to negotiate a different and possibly stronger cryptosystem to be used in subsequent communication.

This extension utilizes an authorization data element in the authenticator of the AP-REQ message [RFC4120]. The client sends the list of enctypes that it supports to the server, the server then informs the client its choice. The negotiated subkey is sent in the AP-REP message [RFC4120].

2. Conventions Used in This Document

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

3. Negotiation Extension

If the client prefers an enctype over that of the service ticket session key, then it SHOULD send a list of enctypes in decreasing preference order to the server. Based on local policy, the client selects enctypes out of all the enctypes available locally to be included in this list and it SHOULD NOT include enctypes that are less preferable than that of the ticket session key in the service ticket. In addition, the client SHOULD NOT include negative (local-use) enctype numbers unless it knows a-priori that the server has been configured to use the same negative enctype numbers for the same enctypes.

The client sends the enctype list via the authorization-data of the authenticator in the AP-REQ [RFC4120]. A new authorization data element type AD-ETYPE-NEGOTIATION is defined.

AD-ETYPE-NEGOTIATION 129
This authorization data element itself is enclosed in the AD-IF-RELEVANT container, thus a correctly implemented server that does not understand this element should ignore it [RFC4120]. The value of this authorization element contains the DER [X680] [X690] encoding of the following ASN.1 type:

EtypeList ::= SEQUENCE OF Int32
-- Specifies the enctypes supported by the client.
-- This enctype list is in decreasing preference order
-- (favorite choice first).
-- Int32 is defined in [RFC4120].

If the EtypeList is present and the server prefers an enctype from the client’s enctype list over that of the AP-REQ authenticator subkey (if that is present) or the service ticket session key, the server MUST create a subkey using that enctype. This negotiated subkey is sent in the subkey field of AP-REP message and it is then used as the protocol key or base key [RFC3961] for subsequent communication.

If the enctype of the ticket session key is included in the enctype list sent by the client, it SHOULD be the last on the list; otherwise this enctype MUST NOT be negotiated if it was not included in the list.

This negotiation extension SHOULD NOT be used when the client does not expect the subkey in the AP-REP message from the server.

A note on key generation: The KDC has a strong Pseudo-Random Number Generator (PRNG), as such the client can take advantage of the randomness provided by the KDC by reusing the KDC key data when generating keys. Implementations SHOULD use the service ticket session key value as a source of additional entropy when generating the negotiated subkey. If the AP-REQ authenticator subkey is present, it MAY also be used as a source of entropy.

The server MAY ignore the preference order indicated by the client. The policy by which the client or the server chooses an enctype (i.e., how the preference order for the supported enctypes is selected) is a local matter.

4. Security Considerations

The client’s enctype list and the server’s reply enctype are part of encrypted data, thus the security considerations are the same as those of the Kerberos encrypted data.
Both the EtypeList and the server’s sub-session key are protected by the session key or sub-session key used for the AP-REQ, and as a result, if a key for a stronger enctype is negotiated underneath a key for a weaker enctype, an attacker capable of breaking the weaker enctype can also discover the key for the stronger enctype. The advantage of this extension is to minimize the amount of cipher text encrypted under a weak enctype to which an attacker has access.

5. Acknowledgments

The authors would like to thank the following individuals for their comments and suggestions: Ken Raeburn, Luke Howard, Tom Yu, Love Hornquist Astrand, Sam Hartman and Martin Rex.

6. IANA Considerations

No IANA actions are required for this document.

7. Normative References


Authors’ Addresses

Larry Zhu
Microsoft Corporation
One Microsoft Way
Redmond, WA  98052
US

Email: lzh@microsoft.com

Paul Leach
Microsoft Corporation
One Microsoft Way
Redmond, WA  98052
US

Email: paulle@microsoft.com

Karthik Jaganathan
Microsoft Corporation
One Microsoft Way
Redmond, WA  98052
US

Email: karthikj@microsoft.com
Intellectual Property Statement

The IETF takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; nor does it represent that it has made any independent effort to identify any such rights. Information on the procedures with respect to rights in RFC documents can be found in BCP 78 and BCP 79.

Copies of IPR disclosures made to the IETF Secretariat and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF on-line IPR repository at http://www.ietf.org/ipr.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at ietf-ipr@ietf.org.

Disclaimer of Validity

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Copyright Statement

Copyright (C) The Internet Society (2005). This document is subject to the rights, licenses and restrictions contained in BCP 78, and except as set forth therein, the authors retain all their rights.

Acknowledgment

Funding for the RFC Editor function is currently provided by the Internet Society.