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Network Working Group
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PPP Authentication Protocols

Status of this Memo

This RFC specifies an IAB standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "IAB Official Protocol Standards" for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Abstract

The Point-to-Point Protocol (PPP) [1] provides a standard method of encapsulating Network Layer protocol information over point-to-point links. PPP also defines an extensible Link Control Protocol, which allows negotiation of an Authentication Protocol for authenticating its peer before allowing Network Layer protocols to transmit over the link.

This document defines two protocols for Authentication: the Password Authentication Protocol and the Challenge-Handshake Authentication Protocol. This memo is the product of the Point-to-Point Protocol Working Group of the Internet Engineering Task Force (IETF). Comments on this memo should be submitted to the ietf-ppp@ucdavis.edu mailing list.

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1. Introduction

PPP has three main components:

1. A method for encapsulating datagrams over serial links.

2. A Link Control Protocol (LCP) for establishing, configuring, and testing the data-link connection.

3. A family of Network Control Protocols (NCPs) for establishing and configuring different network-layer protocols.

In order to establish communications over a point-to-point link, each end of the PPP link must first send LCP packets to configure the data link during Link Establishment phase. After the link has been established, PPP provides for an optional Authentication phase before proceeding to the Network-Layer Protocol phase.

By default, authentication is not mandatory. If authentication of the link is desired, an implementation MUST specify the Authentication-Protocol Configuration Option during Link Establishment phase.

These authentication protocols are intended for use primarily by hosts and routers that connect to a PPP network server via switched circuits or dial-up lines, but might be applied to dedicated links as well. The server can use the identification of the connecting host or router in the selection of options for network layer negotiations.

This document defines the PPP authentication protocols. The Link Establishment and Authentication phases, and the Authentication-Protocol Configuration Option, are defined in The Point-to-Point Protocol (PPP) [1].

1.1. Specification Requirements

In this document, several words are used to signify the requirements of the specification. These words are often capitalized.

MUST
This word, or the adjective "required", means that the definition is an absolute requirement of the specification.

MUST NOT

This phrase means that the definition is an absolute prohibition of the specification.

SHOULD
This word, or the adjective "recommended", means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and carefully weighed before choosing a different course.

MAY
This word, or the adjective "optional", means that this item is one of an allowed set of alternatives. An implementation which does not include this option MUST be prepared to interoperate with another implementation which does include the option.

1.2. Terminology

This document frequently uses the following terms:

authenticator
The end of the link requiring the authentication. The authenticator specifies the authentication protocol to be used in the Configure-Request during Link Establishment phase.

peer
The other end of the point-to-point link; the end which is being authenticated by the authenticator.

silently discard
This means the implementation discards the packet without further processing. The implementation SHOULD provide the capability of logging the error, including the contents of the silently discarded packet, and SHOULD record the event in a statistics counter.

2. Password Authentication Protocol

The Password Authentication Protocol (PAP) provides a simple method for the peer to establish its identity using a 2-way handshake. This is done only upon initial link establishment.

After the Link Establishment phase is complete, an Id/Password pair is repeatedly sent by the peer to the authenticator until authentication is acknowledged or the connection is terminated.

PAP is not a strong authentication method. Passwords are sent over the circuit "in the clear", and there is no protection from playback

or repeated trial and error attacks. The peer is in control of the frequency and timing of the attempts.

Any implementations which include a stronger authentication method (such as CHAP, described below) MUST offer to negotiate that method

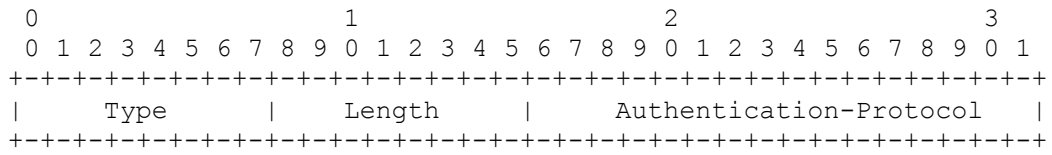
prior to PAP.

This authentication method is most appropriately used where a plaintext password must be available to simulate a login at a remote host. In such use, this method provides a similar level of security to the usual user login at the remote host.

Implementation Note: It is possible to limit the exposure of the plaintext password to transmission over the PPP link, and avoid sending the plaintext password over the entire network. When the remote host password is kept as a one-way transformed value, and the algorithm for the transform function is implemented in the local server, the plaintext password SHOULD be locally transformed before comparison with the transformed password from the remote host.

2.1. Configuration Option Format

A summary of the Authentication-Protocol Configuration Option format to negotiate the Password Authentication Protocol is shown below. The fields are transmitted from left to right.



Type

3

Length

4

Authentication-Protocol

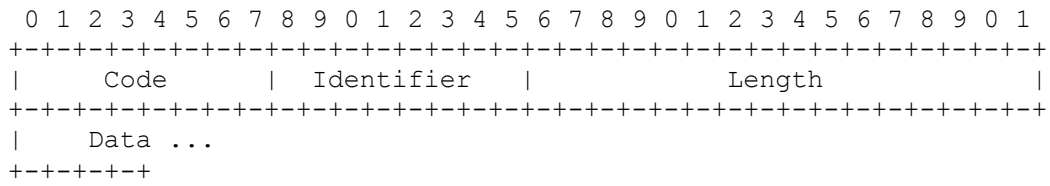
c023 (hex) for Password Authentication Protocol.

Data

There is no Data field.

2.2. Packet Format

Exactly one Password Authentication Protocol packet is encapsulated in the Information field of a PPP Data Link Layer frame where the protocol field indicates type hex c023 (Password Authentication Protocol). A summary of the PAP packet format is shown below. The fields are transmitted from left to right.



Code

The Code field is one octet and identifies the type of PAP packet. PAP Codes are assigned as follows:

1 Authenticate-Request
2 Authenticate-Ack
3 Authenticate-Nak

Identifier

The Identifier field is one octet and aids in matching requests and replies.

Length

The Length field is two octets and indicates the length of the PAP packet including the Code, Identifier, Length and Data fields. Octets outside the range of the Length field should be treated as Data Link Layer padding and should be ignored on reception.

Data

The Data field is zero or more octets. The format of the Data field is determined by the Code field.

2.2.1. Authenticate-Request

Description

The Authenticate-Request packet is used to begin the Password Authentication Protocol. The link peer MUST transmit a PAP packet

with the Code field set to 1 (Authenticate-Request) during the Authentication phase. The Authenticate-Request packet MUST be repeated until a valid reply packet is received, or an optional retry counter expires.

The authenticator SHOULD expect the peer to send an Authenticate-Request packet. Upon reception of an Authenticate-Request packet, some type of Authenticate reply (described below) MUST be returned.

Implementation Note: Because the Authenticate-Ack might be lost, the authenticator MUST allow repeated Authenticate-Request packets after completing the Authentication phase.

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