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Remote Authentication Dial In User Service (RADIUS)

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Abstract

This document describes a protocol for carrying authentication, authorization, and configuration information between a Network Access Server which desires to authenticate its links and a shared Authentication Server.

Implementation Note

This memo documents the RADIUS protocol. There has been some confusion in the assignment of port numbers for this protocol. The early deployment of RADIUS was done using the erroneously chosen port number 1645, which conflicts with the "datametrics" service. The officially assigned port number for RADIUS is 1812.

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1. Introduction

Managing dispersed serial line and modem pools for large numbers of users can create the need for significant administrative support. Since modem pools are by definition a link to the outside world, they require careful attention to security, authorization and accounting. This can be best achieved by managing a single "database" of users, which allows for authentication (verifying user name and password) as well as configuration information detailing the type of service to deliver to the user (for example, SLIP, PPP, telnet, rlogin).

Key features of RADIUS are:

Client/Server Model

A Network Access Server (NAS) operates as a client of RADIUS. The client is responsible for passing user information to designated RADIUS servers, and then acting on the response which is returned.

RADIUS servers are responsible for receiving user connection requests, authenticating the user, and then returning all configuration information necessary for the client to deliver service to the user.

A RADIUS server can act as a proxy client to other RADIUS servers or other kinds of authentication servers.

Network Security

Transactions between the client and RADIUS server are authenticated through the use of a shared secret, which is never sent over the network. In addition, any user passwords are sent encrypted between the client and RADIUS server, to eliminate the possibility that someone snooping on an unsecure network could determine a user's password.

Flexible Authentication Mechanisms

The RADIUS server can support a variety of methods to authenticate a user. When it is provided with the user name and original password given by the user, it can support PPP PAP or CHAP, UNIX login, and other authentication mechanisms.

Extensible Protocol

All transactions are comprised of variable length Attribute-Length-Value 3-tuples. New attribute values can be added without disturbing existing implementations of the protocol.

1.1. Specification of 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 must 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:

service The NAS provides a service to the dial-in user, such as PPP or Telnet.

session Each service provided by the NAS to a dial-in user constitutes a session, with the beginning of the session defined as the point where service is first provided and the end of the session defined as the point where service is ended. A user may have multiple sessions in parallel or series if the NAS supports that.

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. Operation

When a client is configured to use RADIUS, any user of the client presents authentication information to the client. This might be with a customizable login prompt, where the user is expected to enter their username and password. Alternatively, the user might use a link framing protocol such as the Point-to-Point Protocol (PPP), which has authentication packets which carry this information.

Once the client has obtained such information, it may choose to authenticate using RADIUS. To do so, the client creates an "Access-Request" containing such Attributes as the user's name, the user's password, the ID of the client and the Port ID which the user is accessing. When a password is present, it is hidden using a method based on the RSA Message Digest Algorithm MD5 [1].

The Access-Request is submitted to the RADIUS server via the network. If no response is returned within a length of time, the request is re-sent a number of times. The client can also forward requests to an alternate server or servers in the event that the primary server is down or unreachable. An alternate server can be used either after a number of tries to the primary server fail, or in a round-robin fashion. Retry and fallback algorithms are the topic of current research and are not specified in detail in this document.

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