

## **RADIUS Authentication Server MIB**

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### **Abstract**

This memo defines a set of extensions which instrument RADIUS authentication server functions. These extensions represent a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. Using these extensions IP-based management stations can manage RADIUS authentication servers.

### **1. Introduction**

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects used for managing RADIUS authentication servers.

RADIUS authentication servers are today widely deployed by dialup Internet Service Providers, in order to provide authentication services. As a result, the effective management of RADIUS authentication servers is of considerable importance.

## 2. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in RFC 2571 [1].
- o Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIV1 and described in STD 16, RFC 1155 [2], STD 16, RFC 1212 [3] and RFC 1215 [4]. The second version, called SMIV2, is described in STD 58, RFC 2578 [5], RFC 2579 [6] and RFC 2580 [7].
- o Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, RFC 1157 [8]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in RFC 1901 [9] and RFC 1906 [10]. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [10], RFC 2572 [11] and RFC 2574 [12].
- o Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, RFC 1157 [8]. A second set of protocol operations and associated PDU formats is described in RFC 1905 [13].
- o A set of fundamental applications described in RFC 2573 [14] and the view-based access control mechanism described in RFC 2575 [15].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIV2 will be converted into textual descriptions in SMIV1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

### 3. Overview

The RADIUS authentication protocol, described in [16], distinguishes between the client function and the server function. In RADIUS authentication, clients send Access-Requests, and servers reply with Access-Accepts, Access-Rejects, and Access-Challenges. Typically NAS devices implement the client function, and thus would be expected to implement the RADIUS authentication client MIB, while RADIUS authentication servers implement the server function, and thus would be expected to implement the RADIUS authentication server MIB.

However, it is possible for a RADIUS authentication entity to perform both client and server functions. For example, a RADIUS proxy may act as a server to one or more RADIUS authentication clients, while simultaneously acting as an authentication client to one or more authentication servers. In such situations, it is expected that RADIUS entities combining client and server functionality will support both the client and server MIBs.

#### 3.1. Selected objects

This MIB module contains fourteen scalars as well as a single table:

- (1) the RADIUS Authentication Client Table contains one row for each RADIUS authentication client that the server shares a secret with.

Each entry in the RADIUS Authentication Client Table includes twelve columns presenting a view of the activity of the RADIUS authentication server.

### 4. Definitions

RADIUS-AUTH-SERVER-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, OBJECT-IDENTITY,  
Counter32, Integer32,  
IpAddress, TimeTicks, mib-2 FROM SNMPv2-SMI  
SnmpAdminString FROM SNMP-FRAMEWORK-MIB  
MODULE-COMPLIANCE, OBJECT-GROUP FROM SNMPv2-CONF;

radiusAuthServMIB MODULE-IDENTITY  
LAST-UPDATED "9906110000Z"  
ORGANIZATION "IETF RADIUS Working Group."  
CONTACT-INFO  
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EMail: bernarda@microsoft.com"

DESCRIPTION

"The MIB module for entities implementing the server side of the Remote Access Dialin User Service (RADIUS) authentication protocol."

REVISION "9906110000Z" -- 11 Jun 1999

DESCRIPTION "Initial version as published in RFC 2619"

::= { radiusAuthentication 1 }

radiusMIB OBJECT-IDENTITY

STATUS current

DESCRIPTION

"The OID assigned to RADIUS MIB work by the IANA."

::= { mib-2 67 }

radiusAuthentication OBJECT IDENTIFIER ::= {radiusMIB 1}

radiusAuthServMIBObjects OBJECT IDENTIFIER ::= { radiusAuthServMIB 1 }

radiusAuthServ OBJECT IDENTIFIER ::= { radiusAuthServMIBObjects 1 }

radiusAuthServIdent OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The implementation identification string for the RADIUS authentication server software in use on the system, for example; `FNS-2.1'"

::= {radiusAuthServ 1}

radiusAuthServUpTime OBJECT-TYPE

SYNTAX TimeTicks

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"If the server has a persistent state (e.g., a process), this value will be the time elapsed (in hundredths of a seco) since the server process was started. For software without persistent state, this value will be zero."

::= {radiusAuthServ 2}

**radiusAuthServResetTime OBJECT-TYPE**

SYNTAX TimeTicks

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"If the server has a persistent state (e.g., a process) and supports a 'reset' operation (e.g., can be told to re-read configuration files), this value will be the time elapsed (in hundredths of a second) since the server was 'reset.' For software that does not have persistence or does not support a 'reset' operation, this value will be zero."

::= {radiusAuthServ 3}

**radiusAuthServConfigReset OBJECT-TYPE**SYNTAX INTEGER { other(1),  
reset(2),  
initializing(3),  
running(4)}

MAX-ACCESS read-write

STATUS current

## DESCRIPTION

"Status/action object to reinitialize any persistent server state. When set to reset(2), any persistent server state (such as a process) is reinitialized as if the server had just been started. This value will never be returned by a read operation. When read, one of the following values will be returned:  
other(1) - server in some unknown state;  
initializing(3) - server (re)initializing;  
running(4) - server currently running."

::= {radiusAuthServ 4}

-- New Stats proposed by Dale E. Reed Jr (daler@iea-software.com)

**radiusAuthServTotalAccessRequests OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"The number of packets received on the authentication port."

::= { radiusAuthServ 5}

**radiusAuthServTotalInvalidRequests OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

**DESCRIPTION**

"The number of RADIUS Access-Request packets received from unknown addresses."

::= { radiusAuthServ 6 }

**radiusAuthServTotalDupAccessRequests OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

**DESCRIPTION**

"The number of duplicate RADIUS Access-Request packets received."

::= { radiusAuthServ 7 }

**radiusAuthServTotalAccessAccepts OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

**DESCRIPTION**

"The number of RADIUS Access-Accept packets sent."

::= { radiusAuthServ 8 }

**radiusAuthServTotalAccessRejects OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

**DESCRIPTION**

"The number of RADIUS Access-Reject packets sent."

::= { radiusAuthServ 9 }

**radiusAuthServTotalAccessChallenges OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

**DESCRIPTION**

"The number of RADIUS Access-Challenge packets sent."

::= { radiusAuthServ 10 }

**radiusAuthServTotalMalformedAccessRequests OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

**DESCRIPTION**

"The number of malformed RADIUS Access-Request packets received. Bad authenticators and unknown types are not included as malformed Access-Requests."

::= { radiusAuthServ 11 }

**radiusAuthServTotalBadAuthenticators OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of RADIUS Authentication-Request packets  
which contained invalid Signature attributes received."

::= { radiusAuthServ 12 }

**radiusAuthServTotalPacketsDropped OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of incoming packets  
silently discarded for some reason other  
than malformed, bad authenticators or  
unknown types."

::= { radiusAuthServ 13 }

**radiusAuthServTotalUnknownTypes OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of RADIUS packets of unknown type which  
were received."

::= { radiusAuthServ 14 }

-- End of new

**radiusAuthClientTable OBJECT-TYPE**

SYNTAX SEQUENCE OF RadiusAuthClientEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The (conceptual) table listing the RADIUS authentication  
clients with which the server shares a secret."

::= { radiusAuthServ 15 }

**radiusAuthClientEntry OBJECT-TYPE**

SYNTAX RadiusAuthClientEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry (conceptual row) representing a RADIUS  
authentication client with which the server shares a  
secret."

```

INDEX      { radiusAuthClientIndex }
 ::= { radiusAuthClientTable 1 }

```

```

RadiusAuthClientEntry ::= SEQUENCE {
    radiusAuthClientIndex          Integer32,
    radiusAuthClientAddress        IPAddress,
    radiusAuthClientID             SnmpAdminString,
    radiusAuthServAccessRequests  Counter32,
    radiusAuthServDupAccessRequests Counter32,
    radiusAuthServAccessAccepts   Counter32,
    radiusAuthServAccessRejects   Counter32,
    radiusAuthServAccessChallenges Counter32,
    radiusAuthServMalformedAccessRequests Counter32,
    radiusAuthServBadAuthenticators Counter32,
    radiusAuthServPacketsDropped  Counter32,
    radiusAuthServUnknownTypes    Counter32
}

```

```

radiusAuthClientIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A number uniquely identifying each RADIUS
         authentication client with which this server
         communicates."
    ::= { radiusAuthClientEntry 1 }

```

```

radiusAuthClientAddress OBJECT-TYPE
    SYNTAX      IPAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The NAS-IP-Address of the RADIUS authentication client
         referred to in this table entry."
    ::= { radiusAuthClientEntry 2 }

```

```

radiusAuthClientID OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The NAS-Identifier of the RADIUS authentication client
         referred to in this table entry. This is not necessarily
         the same as sysName in MIB II."
    ::= { radiusAuthClientEntry 3 }

```

```

-- Server Counters

```



```
--
-- Responses = AccessAccepts + AccessRejects + AccessChallenges
--
-- Requests - DupRequests - BadAuthenticators - MalformedRequests -
-- UnknownTypes - PacketsDropped - Responses = Pending
--
-- Requests - DupRequests - BadAuthenticators - MalformedRequests -
-- UnknownTypes - PacketsDropped = entries logged
```

**radiusAuthServAccessRequests OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of packets received on the authentication  
port from this client."

::= { radiusAuthClientEntry 4 }

**radiusAuthServDupAccessRequests OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of duplicate RADIUS Access-Request  
packets received from this client."

::= { radiusAuthClientEntry 5 }

**radiusAuthServAccessAccepts OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of RADIUS Access-Accept packets  
sent to this client."

::= { radiusAuthClientEntry 6 }

**radiusAuthServAccessRejects OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of RADIUS Access-Reject packets  
sent to this client."

::= { radiusAuthClientEntry 7 }

**radiusAuthServAccessChallenges OBJECT-TYPE**

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of RADIUS Access-Challenge packets sent to this client."

::= { radiusAuthClientEntry 8 }

radiusAuthServMalformedAccessRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of malformed RADIUS Access-Request packets received from this client.

Bad authenticators and unknown types are not included as malformed Access-Requests."

::= { radiusAuthClientEntry 9 }

radiusAuthServBadAuthenticators OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of RADIUS Authentication-Request packets which contained invalid Signature attributes received from this client."

::= { radiusAuthClientEntry 10 }

radiusAuthServPacketsDropped OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of incoming packets from this client silently discarded for some reason other than malformed, bad authenticators or unknown types."

::= { radiusAuthClientEntry 11 }

radiusAuthServUnknownTypes OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of RADIUS packets of unknown type which were received from this client."

::= { radiusAuthClientEntry 12 }

**-- conformance information**

```
radiusAuthServMIBConformance
    OBJECT IDENTIFIER ::= { radiusAuthServMIB 2 }
radiusAuthServMIBCompliances
    OBJECT IDENTIFIER ::= { radiusAuthServMIBConformance 1 }
radiusAuthServMIBGroups
    OBJECT IDENTIFIER ::= { radiusAuthServMIBConformance 2 }
```

**-- compliance statements**

```
radiusAuthServMIBCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for authentication servers
        implementing the RADIUS Authentication Server MIB."
    MODULE -- this module
    MANDATORY-GROUPS { radiusAuthServMIBGroup }

    OBJECT radiusAuthServConfigReset
    WRITE-SYNTAX INTEGER { reset(2) }
    DESCRIPTION "The only SETable value is 'reset' (2)."
```

**::= { radiusAuthServMIBCompliances 1 }**

**-- units of conformance**

```
radiusAuthServMIBGroup OBJECT-GROUP
    OBJECTS {radiusAuthServIdent,
        radiusAuthServUpTime,
        radiusAuthServResetTime,
        radiusAuthServConfigReset,
        radiusAuthServTotalAccessRequests,
        radiusAuthServTotalInvalidRequests,
        radiusAuthServTotalDupAccessRequests,
        radiusAuthServTotalAccessAccepts,
        radiusAuthServTotalAccessRejects,
        radiusAuthServTotalAccessChallenges,
        radiusAuthServTotalMalformedAccessRequests,
        radiusAuthServTotalBadAuthenticators,
        radiusAuthServTotalPacketsDropped,
        radiusAuthServTotalUnknownTypes,
        radiusAuthClientAddress,
        radiusAuthClientID,
        radiusAuthServAccessRequests,
        radiusAuthServDupAccessRequests,
        radiusAuthServAccessAccepts,
```

```
        radiusAuthServAccessRejects,  
        radiusAuthServAccessChallenges,  
        radiusAuthServMalformedAccessRequests,  
        radiusAuthServBadAuthenticators,  
        radiusAuthServPacketsDropped,  
        radiusAuthServUnknownTypes  
    }  
STATUS    current  
DESCRIPTION  
    "The collection of objects providing management of  
    a RADIUS Authentication Server."  
 ::= { radiusAuthServMIBGroups 1 }
```

END

## 5. References

- [1] Harrington, D., Presuhn, R., and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", RFC 2571, April 1999.
- [2] Rose, M., and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based Internets", STD 16, RFC 1155, May 1990.
- [3] Rose, M., and K. McCloghrie, "Concise MIB Definitions", STD 16, RFC 1212, March 1991.
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- [5] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [6] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
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- [8] Case, J., Fedor, M., Schoffstall, M., and J. Davin, "Simple Network Management Protocol", STD 15, RFC 1157, May 1990.
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- [12] Blumenthal, U., and B. Wijnen, "User-based Security Model for Version 3 of the Simple Network Management Protocol (SNMPv3)", RFC 2574, April 1999.
- [13] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1905, January 1996.
- [14] Levi, D., Meyer, P., and B. Stewart, "SNMP Applications", RFC 2573, April 1999.
- [15] Wijnen, B., Presuhn, R., and K. McCloghrie, "View-based Access Control Model for the Simple Network Management Protocol (SNMP)", RFC 2575, April 1999.
- [16] Rigney, C., Rubens, A., Simpson W. and S. Willens, "Remote Authentication Dial In User Service (RADIUS)", RFC 2138, April 1997.

## 6. Security Considerations

There are a number of management objects defined in this MIB that have a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

There are a number of managed objects in this MIB that may contain sensitive information. These are:

### radiusAuthClientAddress

This can be used to determine the address of the RADIUS authentication client with which the server is communicating. This information could be useful in impersonating the client.

radiusAuthClientID This can be used to determine the client ID of the authentication client with which the server is communicating. This information could be useful in

impersonating the client.

It is thus important to control even GET access to these objects and possibly to even encrypt the values of these object when sending them over the network via SNMP. Not all versions of SNMP provide features for such a secure environment.

SNMPv1 by itself is not a secure environment. Even if the network itself is secure (for example by using IPSec), there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB.

It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model RFC 2574 [12] and the View-based Access Control Model RFC 2575 [15] is recommended. Using these security features, customer/users can give access to the objects only to those principals (users) that have legitimate rights to GET or SET (change/create/delete) them.

## 7. Acknowledgments

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