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D. Nelson  
Enterasys Networks  
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## RADIUS Authentication Client MIB for IPv6

### Status of This Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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### Abstract

This memo defines a set of extensions that instrument RADIUS authentication client 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 clients.

This memo obsoletes RFC 2618 by deprecating the MIB table containing IPv4-only address formats and defining a new table to add support for version-neutral IP address formats. The remaining MIB objects from RFC 2618 are carried forward into this document. The memo also adds UNITS and REFERENCE clauses to selected objects.

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## 1. Introduction

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. The objects defined within this memo relate to the Remote Authentication Dial-In User Service (RADIUS) Authentication Client as defined in RFC 2865 [RFC2865].

## 2. Terminology

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 RFC 2119 [RFC2119].

This document uses terminology from RFC 2865 [RFC2865].

This document uses the word "malformed" with respect to RADIUS packets, particularly in the context of counters of "malformed packets". While RFC 2865 does not provide an explicit definition of "malformed", malformed generally means that the implementation has determined the packet does not match the format defined in RFC 2865. Some implementations may determine that packets are malformed when the Vendor Specific Attribute (VSA) format does not follow the RFC 2865 recommendations for VSAs. Those implementations are used in deployments today, and thus set the de facto definition of "malformed".

## 3. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

## 4. Scope of Changes

This document obsoletes RFC 2618 [RFC2618], RADIUS Authentication Client MIB, by deprecating the radiusAuthServerTable table and adding a new table, radiusAuthServerExtTable, containing radiusAuthServerInetAddressType, radiusAuthServerInetAddress, and

radiusAuthClientServerInetPortNumber. The purpose of these added MIB objects is to support version-neutral IP addressing formats. The existing table containing radiusAuthServerAddress and radiusAuthClientServerPortNumber is deprecated. The remaining MIB objects are carried forward from RFC 2618 into this document. This memo also adds UNITS and REFERENCE clauses to selected objects.

RFC 4001 [RFC4001], which defines the SMI Textual Conventions for IPv6 addresses, contains the following recommendation.

'In particular, when revising a MIB module that contains IPv4 specific tables, it is suggested to define new tables using the textual conventions defined in this memo [RFC4001] that support all versions of IP. The status of the new tables SHOULD be "current", whereas the status of the old IP version specific tables SHOULD be changed to "deprecated". The other approach, of having multiple similar tables for different IP versions, is strongly discouraged.'

## 5. Structure of the MIB Module

The RADIUS authentication protocol, described in RFC 2865 [RFC2865], 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, Network Access Server (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. The client MIB is defined in this document, and the server MIB is defined in [RFC4669].

This MIB module contains two scalars as well as a single table, the RADIUS Authentication Server Table, which contains one row for each RADIUS authentication server with which the client shares a secret. Each entry in the RADIUS Authentication Server Table includes sixteen columns presenting a view of the activity of the RADIUS authentication client.

This MIB imports from [RFC2578], [RFC2580], [RFC3411], and [RFC4001].

## 6. Deprecated Objects

The deprecated table in this MIB is carried forward from RFC 2618 [RFC2618]. There are two conditions under which it MAY be desirable for managed entities to continue to support the deprecated table:

1. The managed entity only supports IPv4 address formats.
2. The managed entity supports both IPv4 and IPv6 address formats, and the deprecated table is supported for backwards compatibility with older management stations. This option SHOULD only be used when the IP addresses in the new table are in IPv4 format and can accurately be represented in both the new table and the deprecated table.

Managed entities SHOULD NOT instantiate row entries in the deprecated table, containing IPv4-only address objects, when the RADIUS server address represented in such a table row is not an IPv4 address. Managed entities SHOULD NOT return inaccurate values of IP address or SNMP object access errors for IPv4-only address objects in otherwise populated tables. When row entries exist in both the deprecated IPv4-only table and the new IP-version-neutral table that describe the same RADIUS server, the row indexes SHOULD be the same for the corresponding rows in each table, to facilitate correlation of these related rows by management applications.

## 7. Definitions

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

IMPORTS

```
MODULE-IDENTITY, OBJECT-TYPE, OBJECT-IDENTITY,
Counter32, Integer32, Gauge32,
IpAddress, TimeTicks, mib-2          FROM SNMPv2-SMI
SnmpAdminString                      FROM SNMP-FRAMEWORK-MIB
InetAddressType, InetAddress,
InetPortNumber                      FROM INET-ADDRESS-MIB
MODULE-COMPLIANCE, OBJECT-GROUP     FROM SNMPv2-CONF;
```

radiusAuthClientMIB MODULE-IDENTITY

```
LAST-UPDATED "200608210000Z" -- 21 August 2006
ORGANIZATION "IETF RADIUS Extensions Working Group."
CONTACT-INFO
    " Bernard Aboba
      Microsoft
      One Microsoft Way
      Redmond, WA 98052
```

US

Phone: +1 425 936 6605

EMail: bernarda@microsoft.com"

DESCRIPTION

"The MIB module for entities implementing the client side of the Remote Authentication Dial-In User Service (RADIUS) authentication protocol. Copyright (C) The Internet Society (2006). This version of this MIB module is part of RFC 4668; see the RFC itself for full legal notices."

REVISION "200608210000Z" -- 21 August 2006

DESCRIPTION

"Revised version as published in RFC 4668. This version obsoletes that of RFC 2618 by deprecating the MIB table containing IPv4-only address formats and defining a new table to add support for version neutral IP address formats. The remaining MIB objects from RFC 2618 are carried forward into this version."

REVISION "199906110000Z" -- 11 Jun 1999

DESCRIPTION "Initial version as published in RFC 2618."

::= { radiusAuthentication 2 }

radiusMIB OBJECT-IDENTITY

STATUS current

DESCRIPTION

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

::= { mib-2 67 }

radiusAuthentication OBJECT IDENTIFIER ::= {radiusMIB 1}

radiusAuthClientMIBObjects OBJECT IDENTIFIER

::= { radiusAuthClientMIB 1 }

radiusAuthClient OBJECT IDENTIFIER

::= { radiusAuthClientMIBObjects 1 }

radiusAuthClientInvalidServerAddresses OBJECT-TYPE

SYNTAX Counter32

UNITS "packets"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { radiusAuthClient 1 }

radiusAuthClientIdentifier OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-only  
 STATUS current  
 DESCRIPTION

"The NAS-Identifier of the RADIUS authentication client.  
 This is not necessarily the same as sysName in MIB II."

REFERENCE "RFC 2865 section 5.32"

::= { radiusAuthClient 2 }

radiusAuthServerTable OBJECT-TYPE

SYNTAX SEQUENCE OF RadiusAuthServerEntry

MAX-ACCESS not-accessible

STATUS deprecated

DESCRIPTION

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

::= { radiusAuthClient 3 }

radiusAuthServerEntry OBJECT-TYPE

SYNTAX RadiusAuthServerEntry

MAX-ACCESS not-accessible

STATUS deprecated

DESCRIPTION

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

INDEX { radiusAuthServerIndex }

::= { radiusAuthServerTable 1 }

RadiusAuthServerEntry ::= SEQUENCE {

radiusAuthServerIndex	Integer32,
radiusAuthServerAddress	IpAddress,
radiusAuthClientServerPortNumber	Integer32,
radiusAuthClientRoundTripTime	TimeTicks,
radiusAuthClientAccessRequests	Counter32,
radiusAuthClientAccessRetransmissions	Counter32,
radiusAuthClientAccessAccepts	Counter32,
radiusAuthClientAccessRejects	Counter32,
radiusAuthClientAccessChallenges	Counter32,
radiusAuthClientMalformedAccessResponses	Counter32,
radiusAuthClientBadAuthenticators	Counter32,
radiusAuthClientPendingRequests	Gauge32,
radiusAuthClientTimeouts	Counter32,
radiusAuthClientUnknownTypes	Counter32,
radiusAuthClientPacketsDropped	Counter32

}

radiusAuthServerIndex OBJECT-TYPE

SYNTAX Integer32 (1..2147483647)

```

MAX-ACCESS not-accessible
STATUS deprecated
DESCRIPTION
    "A number uniquely identifying each RADIUS
    Authentication server with which this client
    communicates."
 ::= { radiusAuthServerEntry 1 }

radiusAuthServerAddress OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION
        "The IP address of the RADIUS authentication server
        referred to in this table entry."
    ::= { radiusAuthServerEntry 2 }

radiusAuthClientServerPortNumber OBJECT-TYPE
    SYNTAX Integer32 (0..65535)
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION
        "The UDP port the client is using to send requests to
        this server."
    REFERENCE "RFC 2865 section 3"
    ::= { radiusAuthServerEntry 3 }

radiusAuthClientRoundTripTime OBJECT-TYPE
    SYNTAX TimeTicks
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION
        "The time interval (in hundredths of a second) between
        the most recent Access-Reply/Access-Challenge and the
        Access-Request that matched it from this RADIUS
        authentication server."
    ::= { radiusAuthServerEntry 4 }

-- Request/Response statistics
--
-- TotalIncomingPackets = Accepts + Rejects + Challenges +
-- UnknownTypes
--
-- TotalIncomingPackets - MalformedResponses -
-- BadAuthenticators - UnknownTypes - PacketsDropped =
-- Successfully received
--
-- AccessRequests + PendingRequests + ClientTimeouts =

```

-- Successfully received

--  
--

radiusAuthClientAccessRequests OBJECT-TYPE

SYNTAX Counter32

UNITS "packets"

MAX-ACCESS read-only

STATUS deprecated

DESCRIPTION

"The number of RADIUS Access-Request packets sent  
to this server. This does not include retransmissions."

REFERENCE "RFC 2865 section 4.1"

::= { radiusAuthServerEntry 5 }

radiusAuthClientAccessRetransmissions OBJECT-TYPE

SYNTAX Counter32

UNITS "packets"

MAX-ACCESS read-only

STATUS deprecated

DESCRIPTION

"The number of RADIUS Access-Request packets  
retransmitted to this RADIUS authentication server."

REFERENCE "RFC 2865 sections 2.5, 4.1"

::= { radiusAuthServerEntry 6 }

radiusAuthClientAccessAccepts OBJECT-TYPE

SYNTAX Counter32

UNITS "packets"

MAX-ACCESS read-only

STATUS deprecated

DESCRIPTION

"The number of RADIUS Access-Accept packets  
(valid or invalid) received from this server."

REFERENCE "RFC 2865 section 4.2"

::= { radiusAuthServerEntry 7 }

radiusAuthClientAccessRejects OBJECT-TYPE

SYNTAX Counter32

UNITS "packets"

MAX-ACCESS read-only

STATUS deprecated

DESCRIPTION

"The number of RADIUS Access-Reject packets  
(valid or invalid) received from this server."

REFERENCE "RFC 2865 section 4.3"

::= { radiusAuthServerEntry 8 }

```
radiusAuthClientAccessChallenges OBJECT-TYPE
    SYNTAX Counter32
    UNITS "packets"
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
        "The number of RADIUS Access-Challenge packets
         (valid or invalid) received from this server."
    REFERENCE "RFC 2865 section 4.4"
    ::= { radiusAuthServerEntry 9 }

-- "Access-Response" includes an Access-Accept, Access-Challenge
-- or Access-Reject

radiusAuthClientMalformedAccessResponses OBJECT-TYPE
    SYNTAX Counter32
    UNITS "packets"
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
        "The number of malformed RADIUS Access-Response
         packets received from this server.
         Malformed packets include packets with
         an invalid length.  Bad authenticators or
         Message Authenticator attributes or unknown types
         are not included as malformed access responses."
    ::= { radiusAuthServerEntry 10 }

radiusAuthClientBadAuthenticators OBJECT-TYPE
    SYNTAX Counter32
    UNITS "packets"
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
        "The number of RADIUS Access-Response packets
         containing invalid authenticators or Message
         Authenticator attributes received from this server."
    REFERENCE "RFC 2865 section 3, RFC 2869 section 5.14"
    ::= { radiusAuthServerEntry 11 }

radiusAuthClientPendingRequests OBJECT-TYPE
    SYNTAX Gauge32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
        "The number of RADIUS Access-Request packets
         destined for this server that have not yet timed out
         or received a response.  This variable is incremented
```

```
        when an Access-Request is sent and decremented due to
        receipt of an Access-Accept, Access-Reject,
        Access-Challenge, timeout, or retransmission."
REFERENCE "RFC 2865 section 2"
 ::= { radiusAuthServerEntry 12 }

radiusAuthClientTimeouts OBJECT-TYPE
    SYNTAX Counter32
    UNITS "timeouts"
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
        "The number of authentication timeouts to this server.
        After a timeout, the client may retry to the same
        server, send to a different server, or
        give up. A retry to the same server is counted as a
        retransmit as well as a timeout. A send to a different
        server is counted as a Request as well as a timeout."
        REFERENCE "RFC 2865 section 2, RFC 2869 section 2.3.2"
    ::= { radiusAuthServerEntry 13 }

radiusAuthClientUnknownTypes OBJECT-TYPE
    SYNTAX Counter32
    UNITS "packets"
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
        "The number of RADIUS packets of unknown type that
        were received from this server on the authentication
        port."
    ::= { radiusAuthServerEntry 14 }

radiusAuthClientPacketsDropped OBJECT-TYPE
    SYNTAX Counter32
    UNITS "packets"
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
        "The number of RADIUS packets that were
        received from this server on the authentication port
        and dropped for some other reason."
    ::= { radiusAuthServerEntry 15 }

-- New MIB Objects in this revision

radiusAuthServerExtTable OBJECT-TYPE
    SYNTAX SEQUENCE OF RadiusAuthServerExtEntry
```

```

MAX-ACCESS not-accessible
STATUS      current
DESCRIPTION
    "The (conceptual) table listing the RADIUS authentication
    servers with which the client shares a secret."
 ::= { radiusAuthClient 4 }

```

```

radiusAuthServerExtEntry OBJECT-TYPE
    SYNTAX      RadiusAuthServerExtEntry
    MAX-ACCESS not-accessible
    STATUS      current
    DESCRIPTION
        "An entry (conceptual row) representing a RADIUS
        authentication server with which the client shares
        a secret."
    INDEX        { radiusAuthServerExtIndex }
    ::= { radiusAuthServerExtTable 1 }

```

```

RadiusAuthServerExtEntry ::= SEQUENCE {
    radiusAuthServerExtIndex          Integer32,
    radiusAuthServerInetAddressType  InetAddressType,
    radiusAuthServerInetAddress      InetAddress,
    radiusAuthClientServerInetPortNumber  InetPortNumber,
    radiusAuthClientExtRoundTripTime      TimeTicks,
    radiusAuthClientExtAccessRequests     Counter32,
    radiusAuthClientExtAccessRetransmissions Counter32,
    radiusAuthClientExtAccessAccepts      Counter32,
    radiusAuthClientExtAccessRejects      Counter32,
    radiusAuthClientExtAccessChallenges   Counter32,
    radiusAuthClientExtMalformedAccessResponses Counter32,
    radiusAuthClientExtBadAuthenticators  Counter32,
    radiusAuthClientExtPendingRequests    Gauge32,
    radiusAuthClientExtTimeouts           Counter32,
    radiusAuthClientExtUnknownTypes       Counter32,
    radiusAuthClientExtPacketsDropped     Counter32,
    radiusAuthClientCounterDiscontinuity   TimeTicks
}

```

```

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

```

```

radiusAuthServerInetAddressType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The type of address format used for the
         radiusAuthServerInetAddress object."
    ::= { radiusAuthServerExtEntry 2 }

radiusAuthServerInetAddress OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The IP address of the RADIUS authentication
         server referred to in this table entry, using
         the version-neutral IP address format."
    ::= { radiusAuthServerExtEntry 3 }

radiusAuthClientServerInetPortNumber OBJECT-TYPE
    SYNTAX      InetPortNumber ( 1..65535 )
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The UDP port the client is using to send requests
         to this server. The value of zero (0) is invalid."
    REFERENCE  "RFC 2865 section 3"
    ::= { radiusAuthServerExtEntry 4 }

radiusAuthClientExtRoundTripTime OBJECT-TYPE
    SYNTAX      TimeTicks
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The time interval (in hundredths of a second) between
         the most recent Access-Reply/Access-Challenge and the
         Access-Request that matched it from this RADIUS
         authentication server."
    REFERENCE  "RFC 2865 section 2"
    ::= { radiusAuthServerExtEntry 5 }

-- Request/Response statistics
--
-- TotalIncomingPackets = Accepts + Rejects + Challenges +
-- UnknownTypes
--
-- TotalIncomingPackets - MalformedResponses -
-- BadAuthenticators - UnknownTypes - PacketsDropped =

```

```
-- Successfully received
--
-- AccessRequests + PendingRequests + ClientTimeouts =
-- Successfully received
--
--

radiusAuthClientExtAccessRequests OBJECT-TYPE
    SYNTAX Counter32
    UNITS "packets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of RADIUS Access-Request packets sent
        to this server. This does not include retransmissions.
        This counter may experience a discontinuity when the
        RADIUS Client module within the managed entity is
        reinitialized, as indicated by the current value of
        radiusAuthClientCounterDiscontinuity."
    REFERENCE "RFC 2865 section 4.1"
    ::= { radiusAuthServerExtEntry 6 }

radiusAuthClientExtAccessRetransmissions OBJECT-TYPE
    SYNTAX Counter32
    UNITS "packets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of RADIUS Access-Request packets
        retransmitted to this RADIUS authentication server.
        This counter may experience a discontinuity when
        the RADIUS Client module within the managed entity
        is reinitialized, as indicated by the current value
        of radiusAuthClientCounterDiscontinuity."
    REFERENCE "RFC 2865 sections 2.5, 4.1"
    ::= { radiusAuthServerExtEntry 7 }

radiusAuthClientExtAccessAccepts OBJECT-TYPE
    SYNTAX Counter32
    UNITS "packets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of RADIUS Access-Accept packets
        (valid or invalid) received from this server.
        This counter may experience a discontinuity when
        the RADIUS Client module within the managed entity
        is reinitialized, as indicated by the current value
```

```
        of radiusAuthClientCounterDiscontinuity."
REFERENCE "RFC 2865 section 4.2"
 ::= { radiusAuthServerExtEntry 8 }

radiusAuthClientExtAccessRejects OBJECT-TYPE
    SYNTAX Counter32
    UNITS "packets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of RADIUS Access-Reject packets
        (valid or invalid) received from this server.
        This counter may experience a discontinuity when
        the RADIUS Client module within the managed
        entity is reinitialized, as indicated by the
        current value of
        radiusAuthClientCounterDiscontinuity."
REFERENCE "RFC 2865 section 4.3"
 ::= { radiusAuthServerExtEntry 9 }

radiusAuthClientExtAccessChallenges OBJECT-TYPE
    SYNTAX Counter32
    UNITS "packets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of RADIUS Access-Challenge packets
        (valid or invalid) received from this server.
        This counter may experience a discontinuity when
        the RADIUS Client module within the managed
        entity is reinitialized, as indicated by the
        current value of
        radiusAuthClientCounterDiscontinuity."
REFERENCE "RFC 2865 section 4.4"
 ::= { radiusAuthServerExtEntry 10 }

-- "Access-Response" includes an Access-Accept, Access-Challenge,
-- or Access-Reject

radiusAuthClientExtMalformedAccessResponses OBJECT-TYPE
    SYNTAX Counter32
    UNITS "packets"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of malformed RADIUS Access-Response
        packets received from this server.
        Malformed packets include packets with
```

an invalid length. Bad authenticators or Message Authenticator attributes or unknown types are not included as malformed access responses. This counter may experience a discontinuity when the RADIUS Client module within the managed entity is reinitialized, as indicated by the current value of radiusAuthClientCounterDiscontinuity."

REFERENCE "RFC 2865 sections 3, 4"

::= { radiusAuthServerExtEntry 11 }

radiusAuthClientExtBadAuthenticators OBJECT-TYPE

SYNTAX Counter32

UNITS "packets"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of RADIUS Access-Response packets containing invalid authenticators or Message Authenticator attributes received from this server. This counter may experience a discontinuity when the RADIUS Client module within the managed entity is reinitialized, as indicated by the current value of radiusAuthClientCounterDiscontinuity."

REFERENCE "RFC 2865 section 3"

::= { radiusAuthServerExtEntry 12 }

radiusAuthClientExtPendingRequests OBJECT-TYPE

SYNTAX Gauge32

UNITS "packets"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of RADIUS Access-Request packets destined for this server that have not yet timed out or received a response. This variable is incremented when an Access-Request is sent and decremented due to receipt of an Access-Accept, Access-Reject, Access-Challenge, timeout, or retransmission."

REFERENCE "RFC 2865 section 2"

::= { radiusAuthServerExtEntry 13 }

radiusAuthClientExtTimeouts OBJECT-TYPE

SYNTAX Counter32

UNITS "timeouts"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of authentication timeouts to this server."

After a timeout, the client may retry to the same server, send to a different server, or give up. A retry to the same server is counted as a retransmit as well as a timeout. A send to a different server is counted as a Request as well as a timeout. This counter may experience a discontinuity when the RADIUS Client module within the managed entity is reinitialized, as indicated by the current value of radiusAuthClientCounterDiscontinuity."

REFERENCE "RFC 2865 sections 2.5, 4.1"

::= { radiusAuthServerExtEntry 14 }

radiusAuthClientExtUnknownTypes OBJECT-TYPE

SYNTAX Counter32

UNITS "packets"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of RADIUS packets of unknown type that were received from this server on the authentication port. This counter may experience a discontinuity when the RADIUS Client module within the managed entity is reinitialized, as indicated by the current value of radiusAuthClientCounterDiscontinuity."

REFERENCE "RFC 2865 section 4"

::= { radiusAuthServerExtEntry 15 }

radiusAuthClientExtPacketsDropped OBJECT-TYPE

SYNTAX Counter32

UNITS "packets"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of RADIUS packets that were received from this server on the authentication port and dropped for some other reason. This counter may experience a discontinuity when the RADIUS Client module within the managed entity is reinitialized, as indicated by the current value of radiusAuthClientCounterDiscontinuity."

::= { radiusAuthServerExtEntry 16 }

radiusAuthClientCounterDiscontinuity OBJECT-TYPE

SYNTAX TimeTicks

UNITS "centiseconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

```

        "The number of centiseconds since the last discontinuity
        in the RADIUS Client counters. A discontinuity may
        be the result of a reinitialization of the RADIUS
        Client module within the managed entity."
 ::= { radiusAuthServerExtEntry 17 }

-- conformance information

radiusAuthClientMIBConformance OBJECT IDENTIFIER
 ::= { radiusAuthClientMIB 2 }

radiusAuthClientMIBCompliances OBJECT IDENTIFIER
 ::= { radiusAuthClientMIBConformance 1 }

radiusAuthClientMIBGroups OBJECT IDENTIFIER
 ::= { radiusAuthClientMIBConformance 2 }

-- compliance statements

radiusAuthClientMIBCompliance MODULE-COMPLIANCE
    STATUS deprecated
    DESCRIPTION
        "The compliance statement for authentication clients
        implementing the RADIUS Authentication Client MIB.
        Implementation of this module is for IPv4-only
        entities, or for backwards compatibility use with
        entities that support both IPv4 and IPv6."
    MODULE -- this module
        MANDATORY-GROUPS { radiusAuthClientMIBGroup }

    ::= { radiusAuthClientMIBCompliances 1 }

radiusAuthClientExtMIBCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for authentication
        clients implementing the RADIUS Authentication
        Client IPv6 Extensions MIB. Implementation of
        this module is for entities that support IPv6,
        or support IPv4 and IPv6."
    MODULE -- this module
        MANDATORY-GROUPS { radiusAuthClientExtMIBGroup }

    OBJECT radiusAuthServerInetAddressType
    SYNTAX InetAddressType { ipv4(1), ipv6(2) }
    DESCRIPTION

```

"An implementation is only required to support  
IPv4 and globally unique IPv6 addresses."

OBJECT radiusAuthServerInetAddress

SYNTAX InetAddress ( SIZE (4|16) )

DESCRIPTION

"An implementation is only required to support  
IPv4 and globally unique IPv6 addresses."

::= { radiusAuthClientMIBCompliances 2 }

-- units of conformance

radiusAuthClientMIBGroup OBJECT-GROUP

OBJECTS { radiusAuthClientIdentifier,  
radiusAuthClientInvalidServerAddresses,  
radiusAuthServerAddress,  
radiusAuthClientServerPortNumber,  
radiusAuthClientRoundTripTime,  
radiusAuthClientAccessRequests,  
radiusAuthClientAccessRetransmissions,  
radiusAuthClientAccessAccepts,  
radiusAuthClientAccessRejects,  
radiusAuthClientAccessChallenges,  
radiusAuthClientMalformedAccessResponses,  
radiusAuthClientBadAuthenticators,  
radiusAuthClientPendingRequests,  
radiusAuthClientTimeouts,  
radiusAuthClientUnknownTypes,  
radiusAuthClientPacketsDropped  
}

STATUS deprecated

DESCRIPTION

"The basic collection of objects providing management of  
RADIUS Authentication Clients."

::= { radiusAuthClientMIBGroups 1 }

radiusAuthClientExtMIBGroup OBJECT-GROUP

OBJECTS { radiusAuthClientIdentifier,  
radiusAuthClientInvalidServerAddresses,  
radiusAuthServerInetAddressType,  
radiusAuthServerInetAddress,  
radiusAuthClientServerInetPortNumber,  
radiusAuthClientExtRoundTripTime,  
radiusAuthClientExtAccessRequests,  
radiusAuthClientExtAccessRetransmissions,  
radiusAuthClientExtAccessAccepts,  
radiusAuthClientExtAccessRejects,  
radiusAuthClientExtAccessChallenges,  
radiusAuthClientExtMalformedAccessResponses,  
radiusAuthClientExtBadAuthenticators,  
radiusAuthClientExtPendingRequests,  
radiusAuthClientExtTimeouts,  
radiusAuthClientExtUnknownTypes,  
radiusAuthClientExtPacketsDropped  
}

```
        radiusAuthClientExtAccessRejects,
        radiusAuthClientExtAccessChallenges,
        radiusAuthClientExtMalformedAccessResponses,
        radiusAuthClientExtBadAuthenticators,
        radiusAuthClientExtPendingRequests,
        radiusAuthClientExtTimeouts,
        radiusAuthClientExtUnknownTypes,
        radiusAuthClientExtPacketsDropped,
        radiusAuthClientCounterDiscontinuity
    }
    STATUS current
    DESCRIPTION
        "The collection of extended objects providing
        management of RADIUS Authentication Clients
        using version-neutral IP address format."
    ::= { radiusAuthClientMIBGroups 2 }
```

END

## 8. Security Considerations

There are no management objects defined in this MIB that have a MAX-ACCESS clause of read-write and/or read-create. So, if this MIB is implemented correctly, then there is no risk that an intruder can alter or create any management objects of this MIB via direct SNMP SET operations.

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability:

### radiusAuthServerIPAddress

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

### radiusAuthClientServerPortNumber

This can be used to determine the port number on which the RADIUS authentication client is sending. This information could be useful in impersonating the client in order to send data to the authentication server.

`radiusAuthServerInetAddress`

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

`radiusAuthClientServerInetPortNumber`

This can be used to determine the port number on which the RADIUS authentication client is sending. This information could be useful in impersonating the client in order to send data to the authentication server.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPsec), even then, 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 module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

## 9. References

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### 9.2. Informative References

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## Appendix A. Acknowledgements

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## Author's Address

David B. Nelson  
Enterasys Networks  
50 Minuteman Road  
Andover, MA 01810  
USA

EMail: dnelson@enterasys.com

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