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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.

Table of Contents

1. Introduction	3
2. Terminology	3
3. The Internet-Standard Management Framework	3
4. Scope of Changes	3
5. Structure of the MIB Module	4
6. Deprecated Objects	5
7. Definitions	5
8. Security Considerations	20
9. References	22
9.1. Normative References	22
9.2. Informative References	22
Appendix A. Acknowledgements	23

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,
        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

9.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC2578] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Structure of Management Information Version 2 (SMIV2)", STD 58, RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Textual Conventions for SMIV2", STD 58, RFC 2579, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Conformance Statements for SMIV2", STD 58, RFC 2580, April 1999.
- [RFC2865] Rigney, C., Willens, S., Rubens, A., and W. Simpson, "Remote Authentication Dial In User Service (RADIUS)", RFC 2865, June 2000.
- [RFC3411] Harrington, D., Presuhn, R., and B. Wijnen, "An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks", STD 62, RFC 3411, December 2002.
- [RFC4001] Daniele, M., Haberman, B., Routhier, S., and J. Schoenwaelder, "Textual Conventions for Internet Network Addresses", RFC 4001, February 2005.

9.2. Informative References

- [RFC2618] Aboba, B. and G. Zorn, "RADIUS Authentication Client MIB", RFC 2618, June 1999.
- [RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.
- [RFC4669] Nelson, D., "RADIUS Authentication Server MIB for IPv6", RFC 4669, August 2006.

Appendix A. Acknowledgements

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