

RADIUS Accounting Server MIB

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Abstract

This memo defines a set of extensions which instrument RADIUS accounting 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 accounting 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 accounting servers.

RADIUS accounting servers are today widely deployed by dialup Internet Service Providers, in order to provide accounting services. As a result, the effective management of RADIUS accounting 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 15, 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 accounting protocol, described in [16], distinguishes between the client function and the server function. In RADIUS accounting, clients send Accounting-Requests, and servers reply with Accounting-Responses. Typically NAS devices implement the client function, and thus would be expected to implement the RADIUS accounting client MIB, while RADIUS accounting servers implement the server function, and thus would be expected to implement the RADIUS accounting server MIB.

However, it is possible for a RADIUS accounting entity to perform both client and server functions. For example, a RADIUS proxy may act as a server to one or more RADIUS accounting clients, while simultaneously acting as an accounting client to one or more accounting 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 thirteen scalars as well as a single table:

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

Each entry in the RADIUS Accounting Client Table includes eleven columns presenting a view of the activity of the RADIUS accounting server.

4. Definitions

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

IMPORTS

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

radiusAccServMIB MODULE-IDENTITY

LAST-UPDATED "9906110000Z" -- 11 Jun 1999
ORGANIZATION "IETF RADIUS 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 server side of the Remote Access Dialin User Service (RADIUS) accounting protocol."

REVISION "9906110000Z" -- 11 Jun 1999

DESCRIPTION "Initial version as published in RFC 2621"

```
 ::= { radiusAccounting 1 }

radiusMIB OBJECT-IDENTITY
    STATUS current
    DESCRIPTION
        "The OID assigned to RADIUS MIB work by the IANA."
    ::= { mib-2 67 }

radiusAccounting OBJECT IDENTIFIER ::= {radiusMIB 2}

radiusAccServMIBObjects OBJECT IDENTIFIER ::=
    { radiusAccServMIB 1 }

radiusAccServ OBJECT IDENTIFIER ::= { radiusAccServMIBObjects 1 }

radiusAccServIdent OBJECT-TYPE
    SYNTAX SnmpAdminString
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The implementation identification string for the
        RADIUS accounting server software in use on the
        system, for example; 'FNS-2.1'"
    ::= {radiusAccServ 1}

radiusAccServUpTime 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
        second) since the server process was started.
        For software without persistent state, this value will
        be zero."
    ::= {radiusAccServ 2}

radiusAccServResetTime 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."
 ::= {radiusAccServ 3}

radiusAccServConfigReset 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."
 ::= {radiusAccServ 4}

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

radiusAccServTotalRequests OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of packets received on the
        accounting port."
 ::= { radiusAccServ 5 }

radiusAccServTotalInvalidRequests OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of RADIUS Accounting-Request packets
        received from unknown addresses."
 ::= { radiusAccServ 6 }

radiusAccServTotalDupRequests OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of duplicate RADIUS Accounting-Request
```

```
        packets received."
 ::= { radiusAccServ 7 }

radiusAccServTotalResponses OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of RADIUS Accounting-Response packets sent."
    ::= { radiusAccServ 8 }

radiusAccServTotalMalformedRequests OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of malformed RADIUS Accounting-Request
        packets received. Bad authenticators or unknown
        types are not included as malformed Access-Requests."
    ::= { radiusAccServ 9 }

radiusAccServTotalBadAuthenticators OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of RADIUS Accounting-Request packets
        which contained invalid Signature attributes."
    ::= { radiusAccServ 10 }

radiusAccServTotalPacketsDropped OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of incoming packets silently discarded
        for a reason other than malformed, bad authenticators,
        or unknown types."
    ::= { radiusAccServ 11 }

radiusAccServTotalNoRecords OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of RADIUS Accounting-Request packets
        which were received and responded to but not
        recorded."
```

```

 ::= { radiusAccServ 12 }

radiusAccServTotalUnknownTypes OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of RADIUS packets of unknowntype which
        were received."
    ::= { radiusAccServ 13 }

-- End of new

radiusAccClientTable OBJECT-TYPE
    SYNTAX SEQUENCE OF RadiusAccClientEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "The (conceptual) table listing the RADIUS accounting
        clients with which the server shares a secret."
    ::= { radiusAccServ 14 }

radiusAccClientEntry OBJECT-TYPE
    SYNTAX RadiusAccClientEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "An entry (conceptual row) representing a RADIUS
        accounting client with which the server shares a secret."
    INDEX { radiusAccClientIndex }
    ::= { radiusAccClientTable 1 }

RadiusAccClientEntry ::= SEQUENCE {
    radiusAccClientIndex Integer32,
    radiusAccClientAddress IpAddress,
    radiusAccClientID SnmpAdminString,
    radiusAccServPacketsDropped Counter32,
    radiusAccServRequests Counter32,
    radiusAccServDupRequests Counter32,
    radiusAccServResponses Counter32,
    radiusAccServBadAuthenticators Counter32,
    radiusAccServMalformedRequests Counter32,
    radiusAccServNoRecords Counter32,
    radiusAccServUnknownTypes Counter32
}

radiusAccClientIndex OBJECT-TYPE
    SYNTAX Integer32 (1..2147483647)

```

```
MAX-ACCESS not-accessible
STATUS      current
DESCRIPTION
    "A number uniquely identifying each RADIUS accounting
    client with which this server communicates."
 ::= { radiusAccClientEntry 1 }

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

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

-- Server Counters
--
-- Requests - DupRequests - BadAuthenticators - MalformedRequests -
-- UnknownTypes - PacketsDropped - Responses = Pending
--
-- Requests - DupRequests - BadAuthenticators - MalformedRequests -
-- UnknownTypes - PacketsDropped - NoRecords = entries logged

radiusAccServPacketsDropped OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of incoming packets received
        from this client and silently discarded
        for a reason other than malformed, bad
        authenticators, or unknown types."
    ::= { radiusAccClientEntry 4 }

radiusAccServRequests OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
```


STATUS current
DESCRIPTION
 "The number of packets received from this
 client on the accounting port."
::= { radiusAccClientEntry 5 }

radiusAccServDupRequests OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of duplicate RADIUS Accounting-Request
 packets received from this client."
 ::= { radiusAccClientEntry 6 }

radiusAccServResponses OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of RADIUS Accounting-Response packets
 sent to this client."
 ::= { radiusAccClientEntry 7 }

radiusAccServBadAuthenticators OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of RADIUS Accounting-Request packets
 which contained invalid authenticators received
 from this client."
 ::= { radiusAccClientEntry 8 }

radiusAccServMalformedRequests OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of malformed RADIUS Accounting-Request
 packets which were received from this client.
 Bad authenticators and unknown types
 are not included as malformed Accounting-Requests."
 ::= { radiusAccClientEntry 9 }

radiusAccServNoRecords OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only

```
    STATUS current
    DESCRIPTION
        "The number of RADIUS Accounting-Request packets
        which were received and responded to but not
        recorded."
    ::= { radiusAccClientEntry 10 }

radiusAccServUnknownTypes 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."
    ::= { radiusAccClientEntry 11 }

-- conformance information

radiusAccServMIBConformance
    OBJECT IDENTIFIER ::= { radiusAccServMIB 2 }
radiusAccServMIBCompliances
    OBJECT IDENTIFIER ::= { radiusAccServMIBConformance 1 }
radiusAccServMIBGroups
    OBJECT IDENTIFIER ::= { radiusAccServMIBConformance 2 }

-- compliance statements

radiusAccServMIBCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for accounting servers
        implementing the RADIUS Accounting Server MIB."
    MODULE -- this module
    MANDATORY-GROUPS { radiusAccServMIBGroup }

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

```
    ::= { radiusAccServMIBCompliances 1 }

-- units of conformance

radiusAccServMIBGroup OBJECT-GROUP
    OBJECTS {radiusAccServIdent,
             radiusAccServUpTime,
```

```
radiusAccServResetTime,
radiusAccServConfigReset,
radiusAccServTotalRequests,
radiusAccServTotalInvalidRequests,
radiusAccServTotalDupRequests,
radiusAccServTotalResponses,
radiusAccServTotalMalformedRequests,
radiusAccServTotalBadAuthenticators,
radiusAccServTotalPacketsDropped,
radiusAccServTotalNoRecords,
radiusAccServTotalUnknownTypes,
radiusAccClientAddress,
radiusAccClientID,
radiusAccServPacketsDropped,
radiusAccServRequests,
radiusAccServDupRequests,
radiusAccServResponses,
radiusAccServBadAuthenticators,
radiusAccServMalformedRequests,
radiusAccServNoRecords,
radiusAccServUnknownTypes
}
STATUS current
DESCRIPTION
    "The collection of objects providing management of
    a RADIUS Accounting Server."
 ::= { radiusAccServMIBGroups 1 }
```

END

5. References

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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.
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- [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., "RADIUS Accounting", RFC 2139, April 1997.

6. Security Considerations

There are management objects (radiusAccServConfigReset) 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:

radiusAccClientAddress

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

radiusAccClientID This can be used to determine the client ID for the accounting 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

The authors acknowledge the contributions of the RADIUS Working Group in the development of this MIB. Thanks to Narendra Gidwani of Microsoft, Allan C. Rubens of MERIT, Carl Rigney of Livingston and Peter Heitman of American Internet Corporation for useful discussions of this problem space.

8. Authors' Addresses

Bernard Aboba
Microsoft Corporation
One Microsoft Way
Redmond, WA 98052

Phone: 425-936-6605
EMail: bernarda@microsoft.com

Glen Zorn
Microsoft Corporation
One Microsoft Way
Redmond, WA 98052

Phone: 425-703-1559
EMail: glennz@microsoft.com

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Acknowledgement

Funding for the RFC Editor function is currently provided by the Internet Society.

