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<Green Usage Monitoring Information Base>
draft-suganuma-greenmib-10.txt


Status of this Memo

Abstract

    This memo defines a portion of the Management Information Base (MIB),
    the GreenUsage-MIB, for use with network management protocols
    in the Internet community.  In particular, the GreenUsage-MIB
    can be used to monitor the power-on/power-off status of electrical
    devices.

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1.  **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].


2.  **Overview**

2.1.  **The GreenUsage monitoring concept**

   GreenUsage-MIB is to monitor the power-on/power-off status of
   electrical devices. If a device is in power-on status beyond business
   hours, it is wasteful usage of electricity. The GreenUsage-MIB concept
   aims to monitor and reduce this wastage.

   This document defines a set of managed objects (MOs) of the GreenUsage-MIB
   that can be used to monitor the power-on/power-off status of electrical
   devices based on their network activity.

   Target devices of the GreenUsage-MIB is all electrical devices. Also the
   GreenUsage-Mib cover that of the Energy Management Framework [RFC7326].
   Refer to the "Target Devices" section in [RFC7326] for the definition
   of target devices.

   Since the GreenUsage-MIB has a simple structure, it is easy to use and
   extend in developing a monitoring system of ALL connected devices including
   various kinds of devices such as poor resources IoT devices.

2.2.  **Terminology**

   Electrical device: a device that consumes electricity. Power-
   on/power-off status indicates whether the device is powered on or
   not. Often it is not possible to get a direct indication of whether a
   device is powered on or not. But indirect means may be used to infer
   the power-on/power-off status of a device. For example, if a device
   shows some network activity, it can be inferred that the device is
   powered on. Note that it is difficult to infer that a device is

powered off.  Also, there may be several states between power-on and
power-off e.g. sleep state, power-saving state, etc.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
"SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and
"OPTIONAL" in this document are be interpreted as described in BCP
14, RFC 2119 [RFC2119].

## 3.  GreenUsage Monitoring Requirements

Multiple mechanisms may be used to determine whether a device is
powered on or not. The mechanisms will depend on the nature of the
device. Since the number of devices may be very large, the
identification, usage type, and location of devices needs to be
addressed with care.

## 4.  MIB Design

The basic principle has been to keep the MIB as simple as possible
and at the same time to make it effective enough so that the
essential needs of monitoring are met.

The GreenUsage-MIB is composed of the following

    - device Table: a list of the devices that will be monitored
    - deviceStatus Table: the power-on/power-off status of the devices

**[5](#)**.  **MIB Definitions**

**[5.1](#)**.  **The GreenUsage-MIB**

```
GREENUSAGE-MIB DEFINITIONS ::= BEGIN
  IMPORTS
    MODULE-IDENTITY,  mib-2, Unsigned32, OBJECT-TYPE
                FROM SNMPv2-SMI                  -- RFC 2578
    TimeStamp, MacAddress, TEXTUAL-CONVENTION
                FROM SNMPv2-TC                   -- RFC 2579
    MODULE-COMPLIANCE, OBJECT-GROUP
                FROM SNMPv2-CONF                 -- RFC 2580
    SnmpAdminString
                FROM SNMP-FRAMEWORK-MIB
    ;

 greenUsageMIB  MODULE-IDENTITY
     LAST-UPDATED "201601260000Z"    --  26th January, 2016
     ORGANIZATION "PREDICT Working Group"
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        Support Group E-mail: xxxxxxxxxxxxxx
          "
      DESCRIPTION
         "This MIB module is for monitoring the power-on/power-off
          status of electrical devices.

          Copyright (C) The IETF Trust (2012). This version of
          this MIB module is part of RFC XXXX; see the RFC itself for
          full legal notices.
          "
  -- RFC Ed.: replace XXXX with the actual RFC number & remove this
  -- note

```
       REVISION "201407210000Z"     --  21th July, 2014
       DESCRIPTION
           "added actualMonitoring to GumStatusDetectionMethod"
       REVISION "201401120000Z"     --  11th January, 2014
       DESCRIPTION
           "added deviceMonitoring to GumStatusDetectionMethod"
       REVISION "201301080000Z"     --  8th January, 2013
       DESCRIPTION
           "added gumDevUsageCreatedTimeStamp to usage table"

       REVISION "201207070000Z"     --  7th July, 2012
       DESCRIPTION
           "The initial version, published as draft-suganuma-greenmib-00.txt"


    -- RFC Ed.: replace XXXX with the actual RFC number & remove this
    -- note

     ::= { mib-2 YYY1 }     -- Will be assigned by IANA

    -- IANA Reg.: Please assign a value for "YYY1" under the
    -- 'mib-2' subtree and record the assignment in the SMI
    -- Numbers registry.

    -- RFC Ed.: When the above assignment has been made, please
    --      remove the above note
    --      replace "YYY1" here with the assigned value and
    --      remove this note.

  -- ----------------------------------------------------------------
  -- Textual Conventions
  -- ----------------------------------------------------------------

    GumStatusDetectionMethod  ::=  TEXTUAL-CONVENTION
        STATUS  current
        DESCRIPTION
            "The object specifies the technology which is used
             to detect the power-on/power-off status of a device.
             The enumerated values and the corresponding
             technology are as follows:
              reserved                   (0): reserved (Not used)
              arpSensing                 (1): arp packets from the
                                              device
              neighborDiscoverySensing   (2): neighbor discovery
                                              packets from the device
              icmpEchoProbing            (3): ICMP echo packets
              switchMonitoring           (4): switch monitoring
              deviceMonitoring           (5): the direct monitoring of
```

```
                                            device status such as CPU
                                            load and memory usage
              actualMonitoring          (6): the actual monitoring of power
                                            status of a device by its own
                                            functions
            "
        SYNTAX  INTEGER
        {
              reserved                   (0),
              arpSensing                 (1),
              neighborDiscoverySensing   (2),
              icmpEchoProbing            (3),
              switchMonitoring           (4),
              deviceMonitoring           (5),
              actualMonitoring           (6)
        }

    GumDeviceStatus  ::=  TEXTUAL-CONVENTION
        STATUS  current
        DESCRIPTION
            "The object represents the power-on/power-off
             status of a monitored device.
              unknown                    (0)
              powerOn                    (1): device is powered on
              powerOff                   (2): device is powered off
              sleepMode                  (3): device is in sleep mode
              powerSavingMode            (4): device is in
                                                power saving mode
            "
        SYNTAX  INTEGER
        {
              unknown                    (0),
              powerOn                    (1),
              powerOff                   (2),
              sleepMode                  (3),
              powerSavingMode            (4)
        }

    -- The GREENUSAGE-MIB has the following 3 primary groups

    gumNotifications     OBJECT IDENTIFIER ::= { greenUsageMIB 0 }
    gumObjects           OBJECT IDENTIFIER ::= { greenUsageMIB 1 }
    gumConformance       OBJECT IDENTIFIER ::= { greenUsageMIB 2 }

    gumDeviceTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF GumDeviceEntry
        MAX-ACCESS  not-accessible
        STATUS      current
```

```
         DESCRIPTION
             "This table models the device list

              Entries in this table are required to survive
              a reboot of the managed entity.
             "
         ::= { gumObjects 1 }

     gumDeviceEntry OBJECT-TYPE
         SYNTAX      GumDeviceEntry
         MAX-ACCESS  not-accessible
         STATUS      current
         DESCRIPTION
             "This entry represents a conceptual row in the
              gumDevice table. It represents a device that
              will be monitored for power-on/power-off status.
             "
         INDEX  { gumDeviceID }
         ::= { gumDeviceTable 1 }

     GumDeviceEntry ::=
         SEQUENCE {
          gumDeviceID          Unsigned32,
          gumDeviceName        SnmpAdminString,
          gumDeviceMacAddress  MacAddress,
          gumDeviceType        SnmpAdminString,
          gumDeviceLocation    SnmpAdminString
         }

     gumDeviceID OBJECT-TYPE
         SYNTAX      Unsigned32
         MAX-ACCESS  not-accessible
         STATUS      current
         DESCRIPTION
             "A unique arbitrary identifier for this device."
         ::= { gumDeviceEntry 1 }

     gumDeviceName OBJECT-TYPE
         SYNTAX      SnmpAdminString (SIZE(1..64))
         MAX-ACCESS  read-create
         STATUS      current
         DESCRIPTION
             "Administratively assigned textual name of this
              device."
         ::= { gumDeviceEntry 2 }

     gumDeviceMacAddress OBJECT-TYPE
         SYNTAX      MacAddress
```

```
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "MAC Address of this device.
             If there is no MAC address, this object will be
             inaccessible."
        ::= { gumDeviceEntry 3 }

    gumDeviceType OBJECT-TYPE
        SYNTAX      SnmpAdminString (SIZE(1..64))
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
            "Administratively assigned textual description about
             usage type of this device."
        ::= { gumDeviceEntry 4 }

    gumDeviceLocation OBJECT-TYPE
        SYNTAX      SnmpAdminString (SIZE(1..64))
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
            "Administratively assigned textual location
             name of this device."
        ::= { gumDeviceEntry 5 }

    gumDevUsageTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF GumDevUsageEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "This table models the device usage status

             Entries in this table are required to survive
             a reboot of the managed entity.
            "
        ::= { gumObjects 2 }

    gumDevUsageEntry OBJECT-TYPE
        SYNTAX      GumDevUsageEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "This entry represents a conceptual row in the
             gumDevUsage table. It represents a power-on/power-off
             status of a monitored device.
            "
        INDEX  { gumDeviceID, gumDevUsageDetID }
```

```
            ::= { gumDevUsageTable 1 }

GumDevUsageEntry ::=
    SEQUENCE {
     gumDevUsageDetID            GumStatusDetectionMethod,
     gumDevUsageDetStatus        GumDeviceStatus,
     gumDevUsageDetTimeStamp     TimeStamp,
     gumDevUsageCreatedTimeStamp TimeStamp
    }

gumDevUsageDetID OBJECT-TYPE
    SYNTAX      GumStatusDetectionMethod
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The detection method by which the usage status is
         computed."
    ::= { gumDevUsageEntry 1 }

gumDevUsageDetStatus OBJECT-TYPE
    SYNTAX      GumDeviceStatus
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "the usage status of the device."
    ::= { gumDevUsageEntry 2 }

gumDevUsageDetTimeStamp OBJECT-TYPE
    SYNTAX      TimeStamp
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "the time at which the usage status of the
         device was computed."
    ::= { gumDevUsageEntry 3 }

gumDevUsageCreatedTimeStamp OBJECT-TYPE
    SYNTAX      TimeStamp
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "the time at which the entry of usage table created."
    ::= { gumDevUsageEntry 4 }

-- Units of conformance
gumGroups       OBJECT IDENTIFIER ::= { gumConformance 1}
gumCompliances  OBJECT IDENTIFIER ::= { gumConformance 2}
```

```
        gumObjectsGroup    OBJECT-GROUP
            OBJECTS {
                    gumDeviceName,
                    gumDeviceMacAddress,
                    gumDeviceType,
                    gumDeviceLocation,
                    gumDevUsageDetStatus,
                    gumDevUsageDetTimeStamp,
                    gumDevUsageCreatedTimeStamp
            }
            STATUS  current
            DESCRIPTION
                " A collection of objects for basic GreenUsage
                  monitoring."
            ::= { gumGroups 1 }

        -- Compliance statements
        gumCompliance MODULE-COMPLIANCE
            STATUS  current
            DESCRIPTION
                "The compliance statement for SNMP entities
                 which implement the GREENUSAGE-MIB
                 "
            MODULE  -- this module
                MANDATORY-GROUPS { gumObjectsGroup
                                 }
            ::= { gumCompliances 1 }

        END
```

6.  Security Considerations
    **There are no management objects defined in this MIB module with a**
    MAX-ACCESS clause of read-write.
    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:
                         gumDeviceName,
                         gumDeviceMacAddress,
                         gumDeviceType,
                         gumDeviceLocation,
                         gumDevUsageDetStatus,
                         gumDevUsageDetTimeStamp,
                         gumDevUsageCreatedTimeStamp
            The above objects may be be used to identify users and their
            activities. Thus these objects may be considered to be
            particularly sensitive and/or private.

    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.

7.  IANA Considerations

    IANA should assign
        1. a base arc in the 'mib-2' (standards track) OID
           tree for the 'greenUsageMIB' MODULE-IDENTITY defined in the
           GREENUSAGE-MIB.

## 8.  References

### 8.1.  Normative References

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### 8.2.  Informative References

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[RFC7326]     Parello, J., Claise, B., Schoening, B. and Quittek, J.,
              Energy Management Framework", RFC 7326, September 2014.

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         Norio Shiratori
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