Internet Engineering Task Force   S. Harnedy
Internet-Draft   Booz Allen Hamilton
Intended status: Standards Track   R. Cole
Expires: July 23, 2011   US Army CERDEC
                                                       I. Chakeres
                                                           CenGen
                                                 January 19, 2011

Definition of Managed Objects for the DYMO Manet Routing Protocol
                  draft-ietf-manet-dymo-mib-04

Abstract

   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 objects for configuring aspects of the
   DYMO routing process. The DYMO-MIB also reports state information,
   performance information, and notifications. In addition to
   configuration, this additional state, performance and notification
   information is useful to management operators troubleshooting DYMO
   routing problems.

Status of This Memo

   This Internet-Draft is submitted in full conformance with the
   provisions of BCP 78 and BCP 79.

   Internet-Drafts are working documents of the Internet Engineering
   Task Force (IETF). Note that other groups may also distribute
   working documents as Internet-Drafts. The list of current Internet-
   Drafts is at http://datatracker.ietf.org/drafts/current/.

   Internet-Drafts are draft documents valid for a maximum of six months
   and may be updated, replaced, or obsoleted by other documents at any
   time. It is inappropriate to use Internet-Drafts as reference
   material or to cite them other than as "work in progress."

   This Internet-Draft will expire on July 23, 2011.

Copyright Notice

Table of Contents

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 objects for configuring aspects of a
    Dynamic MANET On-demand (DYMO) routing [I-D.ietf-manet-dymo] process.
    The DYMO-MIB also reports state information, performance metrics, and
    notifications. In addition to configuration, this additional state,
    performance and notification information is useful to management
    stations troubleshooting routing problems.

2. 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].

3. Conventions

    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].

4. Overview

    The Dynamic MANET On-demand (DYMO) routing protocol
    [I-D.ietf-manet-dymo] is intended for use by mobile nodes in
    wireless, multihop networks. DYMO determines unicast routes among
    DYMO routers within the network in an on-demand fashion, offering
    improved convergence in dynamic topologies.

    A DYMO router's MIB contains DYMO process configuration parameters
    (e.g. interfaces), state information (e.g. sequence number),
    performance counters (e.g. number of control messages), and
    notifications.

4.1. DYMO Management Model

   This section describes the management model for the DYMO routing
   protocol.

   The MIB is comprised of four groups, i.e., Notifications,
   Configuration, State and Performance. The configuration of the
   managed devices is controlled by the objects in the Configuration
   Group. These are divided into Nodal and Interface objects. The bulk
   of the DYMO configuration is in the Nodal objects which control
   protocol behavior. The Interface objects merely identify/configure
   interfaces to enable DYMO routing over their interface. The Nodal
   objects are further divided into routing (or protocol) objects and
   Gateway objects. Gateway objects define other routing prefixes for
   which the node acts as a routing proxy on behalf of these non-local
   prefixes.

   The Configuration Objects drive the behavior of the managed DYMO
   device and hence determines the information in the remaining groups,
   i.e., State, Performance and Notifications. The State objects
   primarily present the resulting forwarding table objects. The
   Performance group primarily is comprised of counters for monitoring
   the number of DYMO routing messages received locally, per node and
   per interface. The Notifications group contains objects which
   monitor changes to the interface configuration and the gateway
   prefixes configuration.

   See the below diagram outlining the DYMO-MIB device management model.

```
+------------------------------------------+
|   CONFIGURATION GROUP                    |
|                                          |
|   Nodal                       Interface  |
|                                          |
|   +-------+  +-------+         +-------+  |
|   |Gateway|  |Routing|         |Routing|  |
|   +-------+  +-------+         +-------+  |
|                                          |
+------------------------------------------+
      ||          ||              ||
      ||          ||              ||
      ||          ||              ||
     \  /        \  /            \  /
      \/          \/              \/
 +-------+  +-------------+  +---------------+
 | STATE |  | PERFORMANCE |  | NOTIFICATIONS |
 | GROUP |  | GROUP       |  | GROUP         |
 +-------+  +-------------+  +---------------+
```
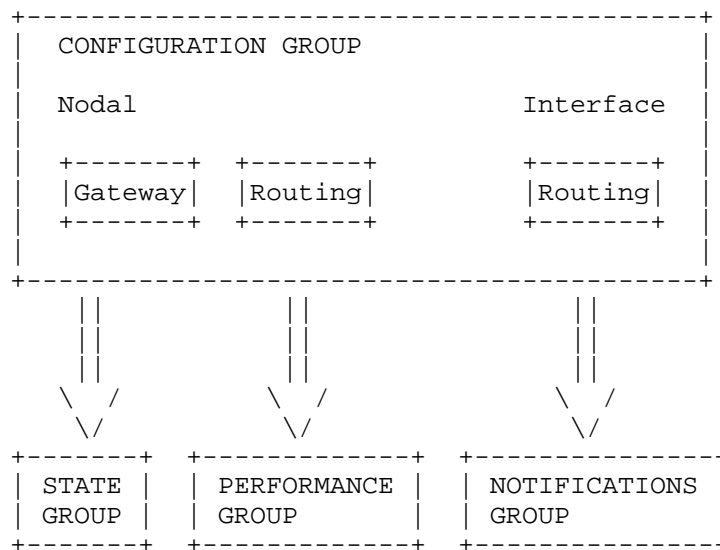
4.2. Terms

   The following definitions apply throughout this document:

   o Configuration Objects - switches, tables, objects which are
      initialized to default settings or set through the management
      interface defined by this MIB.

   o Tunable Configuration Objects - objects whose values affect timing
      or attempt bounds on the DYMO protocol.

   o State Objects - automatically generated values which define the
      current operating state of the DYMO protocol process in the
      router.

   o Performance Objects - automatically generated values which help an
      operator or automated tool to assess the performance of the DYMO
      protocol process on the router and the overall routing performance
      within the DYMO routing domain.

5. Structure of the MIB Module

   This section presents the structure of the DYMO MIB module. The
   objects are arranged into the following groups:

   o dymoMIBNotifications - defines the notifications associated with
      the DYMO-MIB. These are currently limited to notifications of
      interface state changes and gateway prefix changes.

   o dymoMIBObjects - defines the objects forming the basis for the
      DYMO-MIB. These objects are divided up by function into the
      following groups:

   o

      * Configuration Group - This group contains the DYMO objects that
         configure specific options that determine the overall
         performance and operation of the routing protocol for the
         router device and its interfaces.

      * State Group - Contains information describing the current state
         of the DYMO process such as the DYMO routing table.

      * Performance Group - Contains objects which help to characterize
         the performance of the DYMO process, typically statistics
         counters. There are two types of DYMO statistics: global
         counters and per interface counters.

   o dymoMIBConformance - defines minimal and full conformance of
      implementations to this DYMO-MIB.

5.1. Textual Conventions

   The textual conventions used in the DYMO-MIB are as follows. The
   RowStatus and TruthValue textual conventions are imported from RFC
   2579 [RFC2579]. The DymoInterfaceOperStatus is defined within the
   DYMO-MIB. This contains the current operational status of the DYMO
   interface.

5.2. The Configuration Group

   The DYMO device is configured with a set of controls. The list of
   configuration controls for the DYMO device follow.

   Protocol Configuration Parameters:

   o DID

   o MSG_HOPLIMIT

   o ROUTE_TIMEOUT

   o ROUTE_AGE_MIN_TIMEOUT

   o ROUTE_SEQNUM_AGE_MAX_TIMEOUT

  o ROUTE_USED_TIMEOUT

  o ROUTE_DELETE_TIMEOUT

  o ROUTE_RREQ_WAIT_TIME

  o UNICAST_MESSAGE_SENT_TIMEOUT

  o MSG_HOPLIMIT

  o DISCOVERY_ATTEMPTS_MAX

 Protocol Configuration Tables:

  o Responsible Hosts - If RESPONSIBLE_ADDRESSES is set to other than
   self address, then the DYMO router must be configured with the set
   of host addresses for which it is to generate RREP messages.

  o Interfaces - If DYMO_INTERFACES is set to other than all, then the
   DYMO router must be told which interfaces to run the DYMO protocol
   over. This is a table containing the interfaces and associated
   information.

5.3. The State Group

 The State Subtree reports current state information. State
 information from the DYMO-MIB is primarily contained in the 'Routing'
 Table.

5.3.1. Routing Table

 The DYMO routing table contains information related to IP forwarding
 entries found by the node's DYMO processes.

5.4. The Performance Group

 The Performance subtree reports primarily counters that relate to
 DYMO protocol activity. The DYMO performance objects consists of per
 node and per interface objects:

  o OwnSequenceNumber

  o RREQ initiated

  o RREQ sent

  o RREQ received

   o RREP initiated

   o RREP sent

   o RREP received

   o RRER initiated

   o RRER sent

   o RRER received

   o Per interface statistics table with the following entries:

   o

      * RREQ initiated

      * RREQ sent

      * RREQ received

      * RREP initiated

      * RREP sent

      * RREP received

      * RRER initiated

      * RRER sent

      * RRER received

5.5. The Notifications Group

   The Notifications Subtree contains the list of notifications
   supported within the DYMO-MIB and their intended purpose or utility.
   This group is currently contains two notification objects, one
   related to status changes in DYMO interfaces and one related to
   changes in the gateway prefixes table.

6. Relationship to Other MIB Modules

   The text of this section specifies the relationship of the MIB
   modules contained in this document to other standards, particularly
   to standards containing other MIB modules. Definitions imported from
   other MIB modules and other MIB modules that SHOULD be implemented in

conjunction with the MIB module contained within this document are
identified in this section.

6.1. Relationship to the SNMPv2-MIB

The 'system' group in the SNMPv2-MIB [RFC3418] is defined as being
mandatory for all systems, and the objects apply to the entity as a
whole. The 'system' group provides identification of the management
entity and certain other system-wide data. The DYMO-MIB does not
duplicate those objects.

6.2. MIB modules required for IMPORTS

The DYMO-MIB module IMPORTS objects from SNMPv2-SMI [RFC2578],
SNMPv2-TC [RFC2579], SNMPv2-CONF [RFC2580], INET-ADDRESS-MIB
[RFC4001] and IF-MIB [RFC2863].

7. Definitions

    MANET-DYMO-MIB DEFINITIONS ::= BEGIN

    IMPORTS

        MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
        Counter32, Integer32, Unsigned32, mib-2
            FROM SNMPv2-SMI   -- [RFC2578]

        TEXTUAL-CONVENTION, RowStatus, TruthValue
            FROM SNMPv2-TC   -- [RFC2579]

        MODULE-COMPLIANCE, OBJECT-GROUP,
        NOTIFICATION-GROUP
            FROM SNMPv2-CONF   -- [RFC2580]

        InetAddress, InetAddressType,
        InetAddressPrefixLength
            FROM INET-ADDRESS-MIB   -- [RFC4001]

        InterfaceIndexOrZero
            FROM IF-MIB   -- [RFC2863]
        ;

    manetDymoMIB MODULE-IDENTITY
        LAST-UPDATED "201101191200Z" -- January 19, 2011
        ORGANIZATION "IETF MANET Working Group"
        CONTACT-INFO
            "WG E-Mail: manet@ietf.org

                WG Chairs: ian.chakeres@gmail.com
                           jmacker@nrl.navy.mil

                Editors: Sean Harnedy
                           Booz Allen Hamilton
                           333 City Boulevard West
                           Orange, CA 92868
                           USA
                           +1 714 938-3898
                           harnedy_sean@bah.com

                           Robert G. Cole
                           US Army CERDEC
                           Space and Terrestrial Communications
                           328 Hopkins Road
                           Aberdeen Proving Ground, MD 21005
                           USA
                           +1 410 278-6779
                           robert.g.cole@us.army.mil

                           Ian D Chakeres
                           CenGen
                           9250 Bendix Road North
                           Columbia, Maryland 21045
                           USA
                           ian.chakeres@gmail.com"

         DESCRIPTION
            "This MIB module contains managed object definitions for
             the Dynamic MANET On-demand (DYMO) routing protocol as
             defined in: Chakeres,I., and C. Perkins, Dynamic MANET
             On-demand (DYMO) Routing, draft-ietf-manet-dymo-21,
             July 26, 2010.

             Copyright (C) The IETF Trust (2008). This version
             of this MIB module is part of RFC xxxx; see the RFC
             itself for full legal notices."

         -- Revision History
         REVISION   "201101191200Z"   -- January 19, 2011
         DESCRIPTION
            "Fifth draft of this MIB module published as
             draft-ietf-manet-dymo-mib-04.txt.
             Changes include:
             - Incorporated the DYMO ID by adding Instance
               Table.
             - Added dymoSetNotification for improved control
               of DYMO Notifications.

               - Updated various object names to be consistent
                 with current draft-ietf-manet-dymo-21.
               "
           REVISION   "200910251200Z"   -- October 25, 2009
           DESCRIPTION
               "Fourth draft of this MIB module published as
                draft-ietf-manet-dymo-mib-03.txt.
                - Minor changes to textual material, including
                  additions to the IMPORTS text.
                - Added DEFVAL clauses to all read-write
                  configuration objects with defaults identified
                  in the DYMO draft."
           REVISION   "200902241200Z"   -- February 24, 2009
           DESCRIPTION
               "Third draft of this MIB module published as
                draft-ietf-manet-dymo-mib-02.txt.
                - Minor changes to dymoInterfacesTable and
                  dymoResponsibleAddrTable.
                - Added global dymoAdminStatus and interface
                  specific dymoIfAdminStatus.
                - Imported InterfaceIndexOrZero type from
                  IF-MIB."
           REVISION   "200811031200Z"   -- November 03, 2008
           DESCRIPTION
               "Second draft of this MIB module published as
                draft-ietf-manet-dymo-mib-01.txt. Minor changes to
                dymoInterfacesTable and dymoResponsibleAddrTable."
           REVISION   "200805141200Z"   -- May 14, 2008
           DESCRIPTION
               "Initial draft of this MIB module published as
                draft-ietf-manet-dymo-mib-00.txt."
           -- RFC-Editor assigns XXXX
           ::= { mib-2 999 }   -- to be assigned by IANA

       --
       -- TEXTUAL CONVENTIONs
       --

       Status ::= TEXTUAL-CONVENTION
           STATUS   current
           DESCRIPTION
               "An indication of the operability of a DYMO
                function or feature. For example, the status
                of an interface: 'enabled' indicates that
                it is willing to communicate with other DYMO routers,
                and 'disabled' indicates that it is not."
           SYNTAX INTEGER { enabled (1), disabled (2) }

```
   --
   -- Top-Level Object Identifier Assignments
   --

   dymoMIBNotifications OBJECT IDENTIFIER ::= { manetDymoMIB 0 }
   dymoMIBObjects       OBJECT IDENTIFIER ::= { manetDymoMIB 1 }
   dymoMIBConformance   OBJECT IDENTIFIER ::= { manetDymoMIB 2 }


   --
   -- dymoConfigurationGroup
   --
   --    This group contains the DYMO objects that configure specific
   --    options that determine the overall performance and operation
   --    of the routing protocol for the router device and its
   --    interfaces.
   --

   dymoConfigurationGroup  OBJECT IDENTIFIER ::= { dymoMIBObjects 1 }


   --
   -- DYMO Global Router Configuration Group
   --

  dymoRouterConfigGroup OBJECT IDENTIFIER ::= {dymoConfigurationGroup 1}

   dymoInstanceTable  OBJECT-TYPE
      SYNTAX       SEQUENCE OF DymoInstanceEntry
      MAX-ACCESS   not-accessible
      STATUS       current
      DESCRIPTION
         "The DYMO Instance Table describes the DYMO
          ...."
      REFERENCE
         "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
          I., and C. Perkins, July 2010. The DID."
    ::= { dymoRouterConfigGroup 1 }

   dymoInstanceEntry OBJECT-TYPE
      SYNTAX       DymoInstanceEntry
      MAX-ACCESS   not-accessible
      STATUS       current
      DESCRIPTION
         "The DYMO instance entry describes one DYMO
          process as indexed by its DID."
      INDEX { dymoInstanceIndex }
    ::= { dymoInstanceTable 1 }

   DymoInstanceEntry ::=
```

```
      SEQUENCE {
         dymoInstanceIndex
            Integer32,
         dymoInstanceDid
            Integer32,
         dymoInstanceAdminStatus
            Status,
         dymoInstanceRowStatus
            RowStatus
         }

   dymoInstanceIndex  OBJECT-TYPE
      SYNTAX      Integer32 (0..255)
      MAX-ACCESS  not-accessible
      STATUS      current
      DESCRIPTION
         "The instance index for this DYMO process."
      ::= { dymoInstanceEntry 1 }

   dymoInstanceDid OBJECT-TYPE
       SYNTAX      Integer32 (0..255)
       MAX-ACCESS  read-write
       STATUS      current
       DESCRIPTION
          "The DYMO ID of this instance of the
           DYMO process.
           "
   ::= { dymoInstanceEntry 2 }

   dymoInstanceAdminStatus OBJECT-TYPE
       SYNTAX      Status
       MAX-ACCESS  read-write
       STATUS      current
       DESCRIPTION
          "The administrative status of this DYMO
           process in the router.  Multiple processes are
           allowed.  The value 'enabled' denotes that the
           DYMO Process is active on at least one interface;
           'disabled' disables it on all interfaces.

           This object is persistent and when written
           the entity SHOULD save the change to non-volatile storage."
   ::= { dymoInstanceEntry 3 }

   dymoInstanceRowStatus  OBJECT-TYPE
      SYNTAX      RowStatus
      MAX-ACCESS  read-create
      STATUS      current
```

       DESCRIPTION
          "This object permits management of the table
           by facilitating actions such as row creation,
           construction, and destruction. The value of
           this object has no effect on whether other
           objects in this conceptual row can be
           modified."
     ::= { dymoInstanceEntry 4 }

     dymoMaxHopLimit OBJECT-TYPE
        SYNTAX   Unsigned32 (0..255)
        UNITS   "hops"
        MAX-ACCESS read-write
        STATUS   current
        DESCRIPTION
           "The maximum number of hops. The suggested value
            default is 10 hops. This is the DYMO MSG_HOPLIMIT
            parameter value."
        REFERENCE
           "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
            I., and C. Perkins, July 2010. Table 2 Suggested
            Parameter Values."
        DEFVAL { 10 }
     ::= { dymoRouterConfigGroup 2 }

     dymoRouteTimeout OBJECT-TYPE
        SYNTAX   Unsigned32 (1..65535)
        UNITS   "milliseconds"
        MAX-ACCESS read-write
        STATUS   current
        DESCRIPTION
           "The route timeout value. The suggested default
            value is 5000 milliseconds. This is the
            DYMO ROUTE_TIMEOUT parameter value."
        REFERENCE
           "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
            I., and C. Perkins, July 2010. Table 2 Suggested
            Parameter Values."
        DEFVAL { 5000 }
     ::= { dymoRouterConfigGroup 3 }

     dymoRouteAgeMinTimeout OBJECT-TYPE
        SYNTAX   Unsigned32 (1..65535)
        UNITS   "milliseconds"
        MAX-ACCESS read-write
        STATUS   current
        DESCRIPTION
           "The minimum route age timeout value. The

```
            suggested default value is 1000 milliseconds.
            This is the DYMO ROUTE_AGE_MIN_TIMEOUT parameter
            value."
        REFERENCE
            "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
            I., and C. Perkins, July 2010. Table 2 Suggested
            Parameter Values."
        DEFVAL { 1000 }
    ::= { dymoRouterConfigGroup 4 }

    dymoRouteSeqnumAgeMaxTimeout  OBJECT-TYPE
        SYNTAX       Unsigned32 (1..65535)
        UNITS        "milliseconds"
        MAX-ACCESS   read-write
        STATUS       current
        DESCRIPTION
            "The maximum route age timeout value. The
            suggested default value is 60,000 milliseconds.
            This is the DYMO ROUTE_SEQNUM_AGE_MAX_TIMEOUT
            parameter value."
        REFERENCE
            "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
            I., and C. Perkins, July 2010. Table 2 Suggested
            Parameter Values."
        DEFVAL { 60000 }
    ::= { dymoRouterConfigGroup 5 }

    dymoRouteUsedTimeout  OBJECT-TYPE
        SYNTAX       Unsigned32 (1..65535)
        UNITS        "milliseconds"
        MAX-ACCESS   read-write
        STATUS       current
        DESCRIPTION
            "The route used timeout value. The
            suggested default value is to set this
            to the dymoRouteTimeout object value
            (whose default is 5000 milliseconds). This
            is the DYMO ROUTE_USED_TIMEOUT parameter
            value."
        REFERENCE
            "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
            I., and C. Perkins, July 2010. Table 2 Suggested
            Parameter Values."
        DEFVAL { 5000 }
    ::= { dymoRouterConfigGroup 6 }

    dymoRouteDeleteTimeout  OBJECT-TYPE
        SYNTAX       Unsigned32 (1..65535)
```

```
     UNITS         "milliseconds"
     MAX-ACCESS  read-write
     STATUS        current
     DESCRIPTION
         "The route delete timeout value. The
          suggested default value is 2 * dymoRouteTimeout
          value (which is equal to 10000 milliseconds
          if using the default value for the
          dymoRouteTimeout value). This is the
          DYMO ROUTE_DELETE_TIMEOUT parameter value."
     REFERENCE
         "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
          I., and C. Perkins, July 2010. Table 2 Suggested
          Parameter Values."
     DEFVAL { 10000 }
  ::= { dymoRouterConfigGroup 7 }

 dymoRouteRreqWaitTime  OBJECT-TYPE
     SYNTAX        Unsigned32 (1..65535)
     UNITS         "milliseconds"
     MAX-ACCESS  read-write
     STATUS        current
     DESCRIPTION
         "The Route Request wait time. The suggested default
          value is 2000 milliseconds. This is the DYMO
          ROUTE_RREQ_WAIT_TIME parameter value."
     REFERENCE
         "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
          I., and C. Perkins, July 2010. Table 2 Suggested
          Parameter Values."
     DEFVAL { 2000 }
  ::= { dymoRouterConfigGroup 8 }

 dymoDiscoveryAttemptsMax  OBJECT-TYPE
     SYNTAX        Unsigned32 (1..16)
     UNITS         "attempts"
     MAX-ACCESS  read-write
     STATUS        current
     DESCRIPTION
         "The number of Route Request retry attempts. The
          suggested default value is 3. This is the
          DYMO DISCOVERY_ATTEMPTS_MAX parameter value."
     REFERENCE
         "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
          I., and C. Perkins, July 2010. Table 2 Suggested
          Parameter Values."
     DEFVAL { 3 }
  ::= { dymoRouterConfigGroup 9 }
```

```
    dymoUnicastMsgSentTimeout  OBJECT-TYPE
        SYNTAX       Unsigned32 (1..65535)
        UNITS        "milliseconds"
        MAX-ACCESS   read-write
        STATUS       current
        DESCRIPTION
           "The message sent timeout value for unicast packets.
            The suggested default value is 1000 milliseconds.
            This is the DYMO UNICAST_MESSAGE_SENT_TIMEOUT
            parameter value."
        REFERENCE
           "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
            I., and C. Perkins, July 2010. Table 2 Suggested
            Parameter Values."
        DEFVAL { 1000 }
    ::= { dymoRouterConfigGroup 10 }



    --
    -- DYMO Interfaces Configuration Table
    --

    dymoInterfaceTable  OBJECT-TYPE
        SYNTAX       SEQUENCE OF DymoInterfaceEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
           "The DYMO Interface Table describes the DYMO
            interfaces that are participating in the
            DYMO routing protocol. The ifIndex is from
            the interfaces group defined in the Interfaces
            Group MIB."
        REFERENCE
           "RFC 2863 - The Interfaces Group MIB, McCloghrie,
            K., and F. Kastenholtz, June 2000."
    ::= { dymoConfigurationGroup 2 }

    dymoInterfaceEntry OBJECT-TYPE
        SYNTAX       DymoInterfaceEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
           "The DYMO interface entry describes one DYMO
            interface as indexed by its ifIndex."
        INDEX { dymoIfIndex }
    ::= { dymoInterfaceTable 1 }
```

```
    DymoInterfaceEntry ::=
        SEQUENCE {
            dymoIfIndex
                InterfaceIndexOrZero,
            dymoIfAdminStatus
                Status,
            dymoIfRowStatus
                RowStatus
            }

    dymoIfIndex  OBJECT-TYPE
        SYNTAX      InterfaceIndexOrZero
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
           "The ifIndex for this DYMO interface."
        ::= { dymoInterfaceEntry 1 }

    dymoIfAdminStatus OBJECT-TYPE
        SYNTAX      Status
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
            "The DYMO interface's administrative status.
            The value 'enabled' denotes that the interface
            is running the DYMO routing protocol.
            The value 'disabled' denotes that the interface is
            external to DYMO."
        ::= { dymoInterfaceEntry 2 }

    dymoIfRowStatus  OBJECT-TYPE
        SYNTAX      RowStatus
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
           "This object permits management of the table
            by facilitating actions such as row creation,
            construction, and destruction. The value of
            this object has no effect on whether other
            objects in this conceptual row can be
            modified."
    ::= { dymoInterfaceEntry 3 }


    --
    -- DYMO Responsible Address Table
    --
```

```
    dymoResponsibleAddrTable OBJECT-TYPE
        SYNTAX        SEQUENCE OF DymoResponsibleAddrEntry
        MAX-ACCESS    not-accessible
        STATUS        current
        DESCRIPTION
            "The DYMO Responsible Address Table is a
             list of IP address prefixes, and their
             associated prefix length for which the
             DYMO router is responsible."
        REFERENCE
            "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
             I., and C. Perkins, July 2010. Table 3 Important
             Settings."
    ::= { dymoConfigurationGroup 3 }

    dymoResponsibleAddrEntry  OBJECT-TYPE
        SYNTAX        DymoResponsibleAddrEntry
        MAX-ACCESS    not-accessible
        STATUS        current
        DESCRIPTION
            "A single host address range. Information
             in this table is persistent and when this object
             is written, the entity SHOULD save the change to
             non-volatile storage."
        REFERENCE
            "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
             I., and C. Perkins, July 2010. Table 3 Important
             Settings."
        INDEX { dymoResponsibleAddrIndex }
    ::= { dymoResponsibleAddrTable 1 }

    DymoResponsibleAddrEntry ::=
        SEQUENCE {
            dymoResponsibleAddrIndex
                Unsigned32,
            dymoResponsibleAddrType
                InetAddressType,
            dymoResponsibleAddr
                InetAddress,
            dymoResponsibleAddrPrefixLen
                InetAddressPrefixLength,
            dymoResponsibleAddrRowStatus
                RowStatus
            }

    dymoResponsibleAddrIndex  OBJECT-TYPE
        SYNTAX        Unsigned32
        MAX-ACCESS    not-accessible
```

```
     STATUS        current
     DESCRIPTION
        "This object is the index into this table."
  ::= { dymoResponsibleAddrEntry 1 }

  dymoResponsibleAddrType  OBJECT-TYPE
     SYNTAX        InetAddressType
     MAX-ACCESS  read-create
     STATUS        current
     DESCRIPTION
        "The type of the dymoResponsibleAddr, as defined
         in the InetAddress MIB [RFC 4001]."
     REFERENCE
        "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
         I., and C. Perkins, July 2010. Table 3 Important
         Settings."
  ::= { dymoResponsibleAddrEntry 2 }

  dymoResponsibleAddr  OBJECT-TYPE
     SYNTAX        InetAddress
     MAX-ACCESS  read-create
     STATUS        current
     DESCRIPTION
        "The destination IP address of this route. The type
         of this address is determined by the value of the
         dymoResponsibleAddrType object."
     REFERENCE
        "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
         I., and C. Perkins, July 2010. Table 3 Important
         Settings."
  ::= { dymoResponsibleAddrEntry 3 }

  dymoResponsibleAddrPrefixLen  OBJECT-TYPE
     SYNTAX        InetAddressPrefixLength
     MAX-ACCESS  read-create
     STATUS        current
     DESCRIPTION
        "Indicates the number of leading one bits that form the
         mask to be logical-AND'd with the destination address
         before being compared to the value in the dymoResonsibleAddr
         field."
     REFERENCE
        "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
         I., and C. Perkins, July 2010. Table 3 Important
         Settings."
  ::= { dymoResponsibleAddrEntry 4 }

  dymoResponsibleAddrRowStatus  OBJECT-TYPE
```

```
     SYNTAX      RowStatus
     MAX-ACCESS  read-create
     STATUS      current
     DESCRIPTION
        "This object permits management of the table
         by facilitating actions such as row creation,
         construction, and destruction. The value of
         this object has no effect on whether other
         objects in this conceptual row can be
         modified."
  ::= { dymoResponsibleAddrEntry 5 }


  --
  -- dymoStateGroup
  --
  --     Contains information describing the current state of the DYMO
  --     process such as the DYMO routing table.
  --

  dymoStateGroup  OBJECT IDENTIFIER ::= { dymoMIBObjects 2 }

  dymoCurrentSeqNum  OBJECT-TYPE
     SYNTAX      Unsigned32 (1..65535)
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
        "The current DYMO sequence number. The DYMO sequence
         numbers allow nodes to judge the freshness of routing
         information and ensures loop freedom. If the sequence
         number has been assigned to be the largest possible
         number representable as a 16-bit unsigned integer
         (i.e., 65,535), then the sequence number is set to
         256 when incremented.  Setting the sequence number
         to 256 allows other nodes to detect that the number
         has rolled over and the node has not lost its sequence
         number (e.g., via reboot)."
  ::= { dymoStateGroup 1 }

  --
  -- DYMO Routing Table
  --

  dymoRoutingTable  OBJECT-TYPE
     SYNTAX      SEQUENCE OF DymoRoutingEntry
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
```

```
              "The DYMO Routing Table describes the
               current routing information learned
               via DYMO control messages."
          REFERENCE
              "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
               I., and C. Perkins, July 2010. Table 2 Suggested
               Parameter Values."
      ::= { dymoStateGroup 2 }

      dymoRoutingEntry  OBJECT-TYPE
          SYNTAX        DymoRoutingEntry
          MAX-ACCESS    not-accessible
          STATUS        current
          DESCRIPTION
              "The DYMO routing entry contains a
               piece of routing information for a
               particular set of addresses."
          INDEX { dymoRoutingIpAddrType,
                  dymoRoutingIpAddr,
                  dymoRoutingPrefixLen }
      ::= { dymoRoutingTable 1 }

      DymoRoutingEntry ::=
          SEQUENCE {
              dymoRoutingIpAddrType
                 InetAddressType,
              dymoRoutingIpAddr
                 InetAddress,
              dymoRoutingPrefixLen
                 InetAddressPrefixLength,
              dymoRoutingSeqNum
                 Unsigned32,
              dymoRoutingNextHopIpAddrType
                 InetAddressType,
              dymoRoutingNextHopIpAddress
                 InetAddress,
              dymoRoutingNextHopInterface
                 InterfaceIndexOrZero,
              dymoRoutingForwardingFlag
                 TruthValue,
              dymoRoutingBrokenFlag
                 TruthValue,
              dymoRoutingDist
                 Unsigned32
              }

      dymoRoutingIpAddrType  OBJECT-TYPE
          SYNTAX        InetAddressType
```

```
   MAX-ACCESS  not-accessible
   STATUS      current
   DESCRIPTION
      "The routing table address IP address type."
   REFERENCE
      "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
       I., and C. Perkins, July 2010. Table 3 Important
       Settings."
::= { dymoRoutingEntry 1 }

dymoRoutingIpAddr  OBJECT-TYPE
   SYNTAX      InetAddress
   MAX-ACCESS  not-accessible
   STATUS      current
   DESCRIPTION
      "The routing table Inet IPv4 or IPv6 address."
   REFERENCE
      "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
       I., and C. Perkins, July 2010. Table 3 Important
       Settings."
::= { dymoRoutingEntry 2 }

dymoRoutingPrefixLen  OBJECT-TYPE
   SYNTAX      InetAddressPrefixLength
   MAX-ACCESS  not-accessible
   STATUS      current
   DESCRIPTION
      "The prefix length. This is a decimal value that
       indicates the number of contiguous, higher-order
       bits of the address that make up the network
       portion of the address."
   REFERENCE
      "Dynamic MANET On-demand (DYMO) Routing, Chakeres,
       I., and C. Perkins, July 2010. Table 3 Important
       Settings."
::= { dymoRoutingEntry 3 }

dymoRoutingSeqNum  OBJECT-TYPE
   SYNTAX      Unsigned32 (1..65535)
   MAX-ACCESS  read-only
   STATUS      current
   DESCRIPTION
      "The interface sequence number. This
       is the DYMO SeqNum associated with this
       routing information."
::= { dymoRoutingEntry 4 }

dymoRoutingNextHopIpAddrType OBJECT-TYPE
```

```
      SYNTAX        InetAddressType
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
         "The IP address type of the next hop."
      ::= { dymoRoutingEntry 5 }

   dymoRoutingNextHopIpAddress OBJECT-TYPE
      SYNTAX        InetAddress
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
         "The IP address of the next hop."
      ::= { dymoRoutingEntry 6 }

   dymoRoutingNextHopInterface OBJECT-TYPE
      SYNTAX        InterfaceIndexOrZero
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
         "The interface ifIndex for sending
          packets toward the destination route
          address."
      ::= { dymoRoutingEntry 7 }

   dymoRoutingForwardingFlag OBJECT-TYPE
      SYNTAX        TruthValue
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
         "The Forwarding Flag indicates whether
          this route can be used for forwarding
          data packets. A value 'true(1)'
          indicates that this route is being used
          for forwarding of data packets, while
          a value 'false(2)' indicates that it is
          not being used for forwarding."
      ::= { dymoRoutingEntry 8 }

   dymoRoutingBrokenFlag OBJECT-TYPE
      SYNTAX        TruthValue
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
         "The Broken Flag indicates whether
          this Route is broken.  This flag is set
          if the next-hop becomes unreachable or
          in response to processing a RERR. A value
```

```
        'true(1)' indicates that this route is
        broken, while a value 'false(2)'
        indicates that it is not broken."
    ::= { dymoRoutingEntry 9 }

dymoRoutingDist OBJECT-TYPE
    SYNTAX        Unsigned32 (0..65535)
    UNITS         "hops"
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "The distance to the destination address's
        DYMO router. This is a metric of the
        distance a message or piece of information
        has traversed. The minimum value of distance
        is the number of IP hops traversed. The
        maximum value is 65,535.

        This parameter is an optional field in the
        DYMO routing table.  If the DYMO Route.Dist
        is not supported by this device, then this
        object should be set to '0'."
    REFERENCE
        "Dynamic MANET On-demand (DYMO) Routing,
        Chakeres, I., and C. Perkins, April
        2008. Section 3 Terminology."
    ::= { dymoRoutingEntry 10 }




--
-- DYMO Performance Group (Performance Management)
--
--    Contains objects which help to characterize the
--    performance of the DYMO process, typically statistics
--    counters. There are two types of DYMO statistics:
--    global counters and per interface counters.
--

dymoPerformanceGroup  OBJECT IDENTIFIER ::= { dymoMIBObjects 3 }

dymoGlobalPerfGroup  OBJECT IDENTIFIER ::= { dymoPerformanceGroup 1 }

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

```
     STATUS      current
     DESCRIPTION
        "A counter of the number of
         RREQ messages that this DYMO
         device has initiated."
   ::= { dymoGlobalPerfGroup 1 }

   dymoRreqForwarded  OBJECT-TYPE
     SYNTAX      Counter32
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
        "A counter of the number of
         RREQ messages that this DYMO
         device has forwarded, i.e., this
         device neither originated or
         terminated the RREQ message."
   ::= { dymoGlobalPerfGroup 2 }

   dymoRreqReceived  OBJECT-TYPE
     SYNTAX      Counter32
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
        "A counter of the number of
         RREQ messages that this DYMO
         device has received as the
         target of the message."
   ::= { dymoGlobalPerfGroup 3 }

   dymoRrepOriginated  OBJECT-TYPE
     SYNTAX       Counter32
     MAX-ACCESS   read-only
     STATUS       current
     DESCRIPTION
        "A counter of the number of
         RREP messages that this DYMO
         device has initiated."
   ::= { dymoGlobalPerfGroup 4 }

   dymoRrepForwarded  OBJECT-TYPE
     SYNTAX       Counter32
     MAX-ACCESS   read-only
     STATUS       current
     DESCRIPTION
        "A counter of the number of
         RREP messages that this DYMO
         device has forwarded, i.e, this
```

```
      device neither originated or
      terminated the RREP message."
::= { dymoGlobalPerfGroup 5 }

dymoRrepReceived   OBJECT-TYPE
   SYNTAX        Counter32
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
      "A counter of the number of
       RREP messages that this DYMO
       device has received as the
       target of the message."
::= { dymoGlobalPerfGroup 6 }

dymoRrerOriginated   OBJECT-TYPE
   SYNTAX        Counter32
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
      "A counter of the number of
       RRER messages that this DYMO
       device has initiated."
::= { dymoGlobalPerfGroup 7 }

dymoRrerForwarded   OBJECT-TYPE
   SYNTAX        Counter32
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
      "A counter of the number of
       RRER messages that this DYMO
       device has forwarded, i.e., this
       device neither originated or
       terminated the RRER message."
::= { dymoGlobalPerfGroup 8 }

dymoRrerReceived   OBJECT-TYPE
   SYNTAX        Counter32
   MAX-ACCESS  read-only
   STATUS        current
   DESCRIPTION
      "A counter of the number of
       RRER messages that this DYMO
       device has received as the
       target of the message."
::= { dymoGlobalPerfGroup 9 }
```

```
   --
   -- Per DYMO Interface Performance Table
   --

   dymoInterfacePerfGroup OBJECT IDENTIFIER ::= {dymoPerformanceGroup 2}

   dymoInterfacePerfTable OBJECT-TYPE
       SYNTAX         SEQUENCE OF DymoInterfacePerfEntry
       MAX-ACCESS     not-accessible
       STATUS         current
       DESCRIPTION
          "The DYMO Interface Performance Table
           describes the DYMO statistics per
           interface."
   ::= { dymoInterfacePerfGroup 1 }

   dymoInterfacePerfEntry OBJECT-TYPE
       SYNTAX         DymoInterfacePerfEntry
       MAX-ACCESS     not-accessible
       STATUS         current
       DESCRIPTION
          "The DYMO Interface Performance entry
           describes the statistics for a particular
           DYMO interface."
       INDEX { dymoIfPerfIfIndex }
   ::= { dymoInterfacePerfTable 1 }

   DymoInterfacePerfEntry ::=
       SEQUENCE {
          dymoIfPerfIfIndex
             InterfaceIndexOrZero,
          dymoIfRreqOriginated
             Counter32,
          dymoIfRreqForwarded
             Counter32,
          dymoIfRreqReceived
             Counter32,
          dymoIfRrepOriginated
             Counter32,
          dymoIfRrepForwarded
             Counter32,
          dymoIfRrepReceived
             Counter32,
          dymoIfRrerOriginated
             Counter32,
          dymoIfRrerForwarded
             Counter32,
          dymoIfRrerReceived
```

```
         Counter32
          }

 dymoIfPerfIfIndex  OBJECT-TYPE
    SYNTAX       InterfaceIndexOrZero
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
       "The ifIndex for this DYMO interface
        that is collecting this set of
        performance management statistics."
 ::= { dymoInterfacePerfEntry 1 }

 dymoIfRreqOriginated  OBJECT-TYPE
    SYNTAX       Counter32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
       "A counter of the number of
        RREQ messages that this DYMO
        interface has initiated."
 ::= { dymoInterfacePerfEntry 2 }

 dymoIfRreqForwarded  OBJECT-TYPE
    SYNTAX       Counter32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
       "A counter of the number of
        RREQ messages that this DYMO
        interface has forwarded, i.e., this
        interface neither originated nor
        terminated the RREQ message."
 ::= { dymoInterfacePerfEntry 3 }

 dymoIfRreqReceived  OBJECT-TYPE
    SYNTAX       Counter32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
       "A counter of the number of
        RREQ messages that this DYMO
        interface has received as the
        target of the message."
 ::= { dymoInterfacePerfEntry 4 }

 dymoIfRrepOriginated  OBJECT-TYPE
    SYNTAX       Counter32
```

```
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
      "A counter of the number of
       RREP messages that this DYMO
       interface has initiated."
::= { dymoInterfacePerfEntry 5 }

dymoIfRrepForwarded  OBJECT-TYPE
   SYNTAX        Counter32
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
      "A counter of the number of
       RREP messages that this DYMO
       interface has forwarded, i.e., this
       interface neither originated nor
       terminated the RREP message."
::= { dymoInterfacePerfEntry 6 }

dymoIfRrepReceived   OBJECT-TYPE
   SYNTAX        Counter32
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
      "A counter of the number of
       RREP messages that this DYMO
       interface has received as the
       target of the message."
::= { dymoInterfacePerfEntry 7 }

dymoIfRrerOriginated  OBJECT-TYPE
   SYNTAX        Counter32
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
      "A counter of the number of
       RRER messages that this DYMO
       interface has initiated."
::= { dymoInterfacePerfEntry 8 }

dymoIfRrerForwarded  OBJECT-TYPE
   SYNTAX        Counter32
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
      "A counter of the number of
       RRER messages that this DYMO
```

```
        interface has forwarded, i.e., this
        interface neither originated nor
        terminated the RRER message."
::= { dymoInterfacePerfEntry 9 }

dymoIfRrerReceived  OBJECT-TYPE
   SYNTAX       Counter32
   MAX-ACCESS   read-only
   STATUS       current
   DESCRIPTION
       "A counter of the number of
        RRER messages that this DYMO
        interface has received as the
        target of the message."
::= { dymoInterfacePerfEntry 10 }




--
-- Notifications
--

dymoMIBNotifControl OBJECT IDENTIFIER ::= { dymoMIBNotifications 1 }
dymoMIBNotifObjects OBJECT IDENTIFIER ::= { dymoMIBNotifications 2 }

-- dymoMIBNotifControl

dymoSetNotification OBJECT-TYPE
        SYNTAX       OCTET STRING (SIZE(4))
        MAX-ACCESS   read-write
        STATUS       current
        DESCRIPTION
          "A 4-octet string serving as a bit map for
           the notification events defined by the DYMO
           notifications. This object is used to enable
           and disable specific DYMO notifications where
           a 1 in the bit field represents enabled. The
           right-most bit (least significant) represents
           notification 0.

           This object is persistent and when written
           the entity SHOULD save the change to
           non-volatile storage.
           "
         ::= { dymoMIBNotifControl 1 }
```

```
   -- dymoMIBNotifObjects

   dymoInstanceAdminStatusChange  NOTIFICATION-TYPE
      OBJECTS      { dymoInstanceAdminStatus,
                     dymoInstanceDid
                   }
      STATUS       current
      DESCRIPTION
         "This notification is generated when the
          administrative status of a DYMO process changes."
   ::= { dymoMIBNotifObjects 1 }

   dymoInterfaceAdminStatusChange  NOTIFICATION-TYPE
      OBJECTS      { dymoIfAdminStatus }
      STATUS       current
      DESCRIPTION
         "This notification is generated when the
          administrative status of a DYMO interface changes."
   ::= { dymoMIBNotifObjects 2 }

   dymoResponsibleAddrEntryChange  NOTIFICATION-TYPE
      OBJECTS      { dymoResponsibleAddrRowStatus }
      STATUS       current
      DESCRIPTION
         "This notification is generated when the status
          of an entry in the DYMO Responsible Address
          Table changes. This includes the creation or
          deletion of a row."
   ::= { dymoMIBNotifObjects 3 }

   --
   -- Compliance Statements
   --

   dymoCompliances  OBJECT IDENTIFIER ::= { dymoMIBConformance 1 }
   dymoMIBGroups    OBJECT IDENTIFIER ::= { dymoMIBConformance 2 }

   dymoBasicCompliance  MODULE-COMPLIANCE
      STATUS current
      DESCRIPTION "The basic implementation requirements for
                   managed network entities that implement
                   the DYMO routing protocol."
      MODULE  -- this module
      MANDATORY-GROUPS { dymoConfigObjectsGroup }
   ::= { dymoCompliances 1 }

   dymoFullCompliance MODULE-COMPLIANCE
      STATUS current
```

```
         DESCRIPTION "The full implementation requirements for managed
                      network entities that implement the DYMO routing
                      protocol."
         MODULE  -- this module
         MANDATORY-GROUPS { dymoConfigObjectsGroup,
                            dymoStateObjectsGroup,
                            dymoPerfObjectsGroup,
                            dymoNotifObjectsGroup,
                            dymoNotificationGroup }
      ::= { dymoCompliances 2 }

      --
      -- Units of Conformance
      --

      dymoConfigObjectsGroup OBJECT-GROUP
         OBJECTS {
                  dymoInstanceAdminStatus,
                  dymoInstanceDid,
                  dymoInstanceRowStatus,
                  dymoMaxHopLimit,
                  dymoRouteTimeout,
                  dymoRouteAgeMinTimeout,
                  dymoRouteSeqnumAgeMaxTimeout,
                  dymoRouteUsedTimeout,
                  dymoRouteDeleteTimeout,
                  dymoRouteRreqWaitTime,
                  dymoDiscoveryAttemptsMax,
                  dymoUnicastMsgSentTimeout,
                  dymoIfAdminStatus,
                  dymoIfRowStatus,
                  dymoResponsibleAddrType,
                  dymoResponsibleAddr,
                  dymoResponsibleAddrPrefixLen,
                  dymoResponsibleAddrRowStatus
         }
         STATUS  current
         DESCRIPTION
            "Set of DYMO configuration objects implemented
             in this module."
      ::= { dymoMIBGroups 1 }

      dymoStateObjectsGroup  OBJECT-GROUP
         OBJECTS {
                  dymoCurrentSeqNum,
                  dymoRoutingSeqNum,
                  dymoRoutingNextHopIpAddrType,
                  dymoRoutingNextHopIpAddress,
```

```
             dymoRoutingNextHopInterface,
             dymoRoutingForwardingFlag,
             dymoRoutingBrokenFlag,
             dymoRoutingDist
     }
     STATUS  current
     DESCRIPTION
        "Set of DYMO state objects implemented
         in this module."
  ::= { dymoMIBGroups 2 }

  dymoPerfObjectsGroup  OBJECT-GROUP
     OBJECTS {
             dymoRreqOriginated,
             dymoRreqForwarded,
             dymoRreqReceived,
             dymoRrepOriginated,
             dymoRrepForwarded,
             dymoRrepReceived,
             dymoRrerOriginated,
             dymoRrerForwarded,
             dymoRrerReceived,
             dymoIfRreqOriginated,
             dymoIfRreqForwarded,
             dymoIfRreqReceived,
             dymoIfRrepOriginated,
             dymoIfRrepForwarded,
             dymoIfRrepReceived,
             dymoIfRrerOriginated,
             dymoIfRrerForwarded,
             dymoIfRrerReceived
     }
     STATUS  current
     DESCRIPTION
        "Set of DYMO statistic objects implemented
         in this module for performance management."
  ::= { dymoMIBGroups 3 }

  dymoNotifObjectsGroup OBJECT-GROUP
     OBJECTS {
        dymoSetNotification
     }
     STATUS  current
     DESCRIPTION
        "Set of DYMO notifications objects implemented
         in this module."
  ::= { dymoMIBGroups 4 }
```

```
   dymoNotificationGroup NOTIFICATION-GROUP
      NOTIFICATIONS {
         dymoInstanceAdminStatusChange,
         dymoInterfaceAdminStatusChange,
         dymoResponsibleAddrEntryChange
      }
      STATUS  current
      DESCRIPTION
         "Set of DYMO notifications implemented in this
          module."
   ::= { dymoMIBGroups 5 }

   END
```

8. Security Considerations

   [TODO] Each specification that defines one or more MIB modules MUST
   contain a section that discusses security considerations relevant to
   those modules. This section MUST be patterned after the latest
   approved template (available at
   http://www.ops.ietf.org/mib-security.html). Remember that the
   objective is not to blindly copy text from the template, but rather
   to think and evaluate the risks/vulnerabilities and then state/
   document the result of this evaluation.

   [TODO] if you have any read-write and/or read-create objects, please
   include the following boilerplate paragraph.

   There are a number of management objects defined in this MIB module
   with 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. These are the tables and objects and their
   sensitivity/vulnerability:

   o [TODO] writable MIB objects that could be especially disruptive if
      abused MUST be explicitly listed by name and the associated
      security risks MUST be spelled out; RFC 2669 has a very good
      example.

   o [TODO] list the writable tables and objects and state why they are
      sensitive.

   [TODO] else if there are no read-write objects in your MIB module,
   use the following boilerplate paragraph.

   There are no management objects defined in this MIB module that have

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

[TODO] if you have any sensitive readable objects, please include the
following boilerplate paragraph.

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:

o [TODO] you must explicitly list by name any readable objects that
   are sensitive or vulnerable and the associated security risks MUST
   be spelled out (for instance, if they might reveal customer
   information or violate personal privacy laws such as those of the
   European Union if exposed to unauthorized parties)

o [TODO] list the tables and objects and state why they are
   sensitive.

[TODO] discuss what security the protocol used to carry the
information should have. The following three boilerplate paragraphs
should not be changed without very good reason. Changes will almost
certainly require justification during IESG review.

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. IANA Considerations

   [TODO] In order to comply with IESG policy as set forth in
   http://www.ietf.org/ID-Checklist.html, every Internet-Draft that is
   submitted to the IESG for publication MUST contain an IANA
   Considerations section. The requirements for this section vary
   depending what actions are required of the IANA. see RFC4181 section
   3.5 for more information on writing an IANA clause for a MIB module
   document.

   [TODO] select an option and provide the necessary details.

   Option #1:

      The MIB module in this document uses the following IANA-assigned
      OBJECT IDENTIFIER values recorded in the SMI Numbers registry:

      Descriptor   OBJECT IDENTIFIER value
      ----------   -----------------------

      sampleMIB { mib-2 XXX }

   Option #2:

   Editor's Note (to be removed prior to publication): the IANA is
   requested to assign a value for "XXX" under the 'mib-2' subtree and
   to record the assignment in the SMI Numbers registry. When the
   assignment has been made, the RFC Editor is asked to replace "XXX"
   (here and in the MIB module) with the assigned value and to remove
   this note.

   Note well: prior to official assignment by the IANA, a draft document
   MUST use place-holders (such as "XXX" above) rather than actual
   numbers. See RFC4181 Section 4.5 for an example of how this is done
   in a draft MIB module.

   Option #3:

   This memo includes no request to IANA.

10. Contributors

   This MIB document uses the template authored by D. Harrington which
   is based on contributions from the MIB Doctors, especially Juergen
   Schoenwaelder, Dave Perkins, C.M.Heard and Randy Presuhn.

11. Acknowledgements

12. References

12.1. Normative References

   [RFC2863]   McCloghrie, K. and F. Kastenholz, "The
                        Interfaces Group MIB", RFC 2863, June 2000.

   [RFC3418]   Presuhn, R., "Management Information Base
                        (MIB) for the Simple Network Management
                        Protocol (SNMP)", STD 62, RFC 3418,
                        December 2002.

   [RFC4001]   Daniele, M., Haberman, B., Routhier, S., and
                        J. Schoenwaelder, "Textual Conventions for
                        Internet Network Addresses", RFC 4001,
                        February 2005.

   [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.

   [I-D.ietf-manet-dymo] Chakeres, I. and C. Perkins, "Dynamic MANET
                        On-demand (DYMO) Routing",
                        draft-ietf-manet-dymo-21 (work in progress),
                        July 2010.

12.2. Informative References

   [RFC3410]   Case, J., Mundy, R., Partain, D., and B.
                        Stewart, "Introduction and Applicability
                        Statements for Internet-Standard Management
                        Framework", RFC 3410, December 2002.

Appendix A. Change Log

   This section identifies the changes that have been made from
   draft-ietf-manet-dymo-mib-00 .

   These changes were made from draft-ietf-manet-dymo-mib-00 to
   draft-ietf-manet-dymo-mib-01.

   1. Only minor changes of a typographic nature, e.g., read-only to
       read-write on MAX_ACCESS clauses of a few configuration objects.

   These changes were made from draft-ietf-manet-dymo-mib-01 to
   draft-ietf-manet-dymo-mib-02.

   1. Added the ForwardingFlag and BrokenFlag objects to the DYMO
       Routing Table.

   2. Added the TruthValue Textual Convention to handle the new Routing
       Table objects.

   3. Added the DYMO device management model to the introductory
       sections of this draft.

   4. General clean up of the introductory sections of this draft.

   These changes were made from draft-ietf-manet-dymo-mib-02 to
   draft-ietf-manet-dymo-mib-03.

   1. Minor changes to the textual material and added to the IMPORTS
       text in the introductory material.

   2. Added DEFVAL clauses to all read-write configuration objects
       having default values identified in the DYMO specification.

   These changes were made from draft-ietf-manet-dymo-mib-03 to
   draft-ietf-manet-dymo-mib-04.

   1. Incorporated the DID into the Configuration Group by changing the
       dymoAdminStatus object to an Instance Table. This allows for the
       presence of multiple DYMO processes concurrent on the same
       router.

   2. Added the dymoNotifObjectsGroup and its dymoSetNotifications
       object to allow for individual control of the DYMO Notifications.
       Updated the Conformance sections accordingly.

   3. Renamed several of the Configuration Objects to be consistent
       with the naming within the current draft-ietf-manet-dymo-21.

Appendix B. Open Issues

   This section contains the set of open issues related to the
   development and design of the DYMO-MIB. This section will not be
   present in the final version of the MIB and will be removed once all
   the open issues have been resolved.

   1. Work on the Security Section. This MIB does have settable
       objects, but not sensitive objects (true?).

   2. Work on the relationship to other MIBs, IF-MIB, NHDP-MIB.

   3. Cleanup all the [TODOs] from the MIB template.

Appendix C.

   ****
   * Note to the RFC Editor (to be removed prior to publication) *
   *   *
   * 1) The reference to RFCXXXX within the DESCRIPTION clauses *
   * of the MIB module point to this draft and are to be   *
   * assigned by the RFC Editor.   *
   *   *
   * 2) The reference to RFCXXX2 throughout this document point *
   * to the current draft-ietf-manet-dymo-xx.txt. This   *
   * need to be replaced with the XXX RFC number.   *
   *   *
   ****

Authors' Addresses

   Sean Harnedy
   Booz Allen Hamilton
   333 City Boulevard West
   Orange, California 92868
   USA

   Phone: +1 714 938-3898
   EMail: harnedy_sean@bah.com

Robert G. Cole
US Army CERDEC
328 Hopkins Road, Bldg 245
Aberdeen Proving Ground, Maryland 21005
USA

Phone: +1 410 278 6779
EMail: robert.g.cole@us.army.mil
URI: http://www.cs.jhu.edu/~rgcole/

Ian D Chakeres
CenGen
9250 Bendix Road North
Columbia, Maryland 21045
USA

EMail: ian.chakeres@gmail.com
URI: http://www.ianchak.com/