        Definition of Managed Objects for the MANET Essential Connected
                    Dominating Set (E-CDS) Process
                    draft-nguyen-manet-ecds-mib-02

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
   Essential Connected Dominating Set (E-CDS) process for Mobile Ad-Hoc
   Networks (MANETs). The ECDS-MIB also reports state information,
   performance metrics, and notifications. In addition to
   configuration, the additional state and performance information is
   useful to operators troubleshooting multicast forwarding problems.

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1. Introduction

   This memo defines a portion of the Management Information Base (MIB)
   for use with network management protocols in the Internet community.
   In particular, it describes objects for configuring aspects of a
   process implementing the Essential-Connected Dominating Set (E-CDS)
   [RFC5614] algorithm for Mobile Ad-Hoc Networks (MANETs). The E-CDS
   process transforms a 2-hop neighborhood topology information set for
   routers to dynamically perform relay self-election to form a
   Connected Dominating Set (CDS). The ECDS-MIB, an extension to the
   SMF-MIB [draft-ietf-manet-smf-mib-06], reports state information,
   performance metrics, and notifications. In addition to
   configuration, this additional state and performance information is
   useful to operators troubleshooting multicast forwarding 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
   [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, [RFC2578], STD 58, [RFC2579] and STD 58,
   [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 [RFC2119].

4. Overview

   The E-CDS algorithm provides method for implementing selection of
   Multipoint Relay nodes that define an estimate of the Minimum
   Connected Dominating Set (MCDS) flooding. The MCDS provides an
   efficient and complete coverage of the nodes comprising the MANET.
   The packet forwarding rules do not require knowledge of the previous
   hop. Routers that run Simplified Multicast Forwarding (SMF)
   [RFC6621] and have E-CDS enabled can be mixed with routers that run
   SMF and Classic Flooding (CF) enabled without a problem, even when
   the CF nodes are not participating in the Neighborhood Discovery
   Protocol (NHDP) [RFC6130]. Another benefit is that packets
   opportunistically received from non-symmetric neighbors may be
   forwarded without compromising flooding efficiency or correctness.

Furthermore, multicast sources not participating in NHDP may freely
inject their traffic and any neighboring E-CDS relays will properly
forward the traffic. The E-CDS based relay set selection algorithm
is defined in [RFC5614].

4.1. ECDS-MIB Management Model

As mentioned in Overview Section, the ECDS-MIB is an extension to
SMF-MIB. The SMF-MIB defines the management interfaces into the SMF
process. The SMF process is a framework for efficient broadcast
capabilities within a MANET. As part of the management interfaces,
the SMF-MIB contains configuration objects required for the common
management of all CDS processes. The SMF-MIB contains a capabilities
table which lists the set of CDS algorithms supported by the specific
router. However, the SMF-MIB does not define objects for
configuration which are specific to the particular CDS process in
question. Hence, it is required that additional MIB modules be
defined for each new CDS process implemented on the router. In this
sense, these additional MIB-modules extend the SMF-MIB.

```
     _____                  _____
    |               |                |              |
    | Neighborhood  |                |  Relay Set   |
    |  Discovery    |-------------->|  Selection   |
    |               |    neighbor    |  Algorithm   |
    |_____|      info      |_____|
           \                              /
            \                            /
     neighbor\                          /forwarding
       info*   \      _____     /  status
                \    |            |   /
              `-->| Forwarding |<--'
                  |  Process   |
  ~~~~~~~~~~~~~~~~>|_____|~~~~~~~~~~~~~~~~~~>
    incoming packet,              forwarded packets
    interface id*, and
    previous hop*
```

Figure 1: SMF router Architecture.

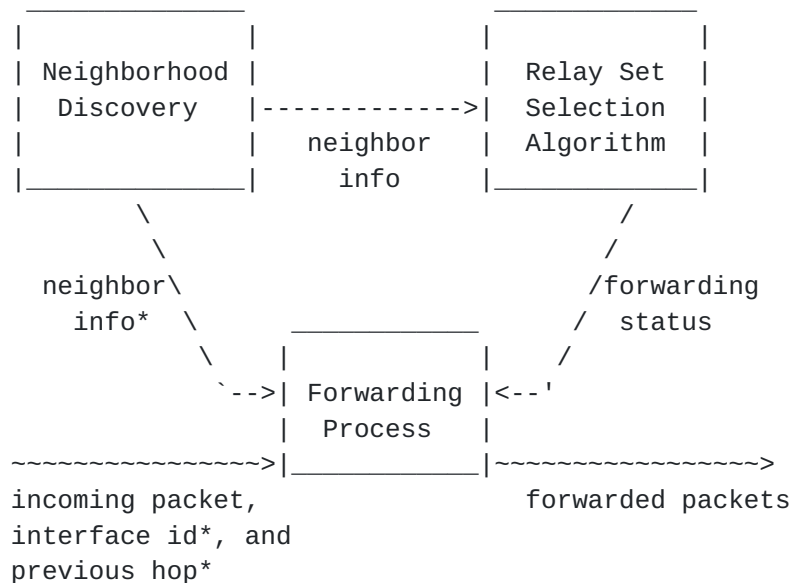The various CDS algorithms are referred to as Relay Set Selection
Algorithm (RSSA) within the SMF specification. The RSSAs can rely
upon topology information gotten from the MANET NHDP, from the
specific MANET routing protocol running on the node, or from Layer 2
information passed up to the higher layer protocol processes. In the
ECDS process, nodes can select themselves as relays using a router

identifier and a nodal metric known as "Router Priority" for all one-
hop and two-hop neighbors. Changing the Router Priority can result
in different realizations of CDSs for a given network topology.

4.2. Terms

The following definitions apply throughout this document:

o Control Objects - Objects which are initialized to default
   settings or set through the management interface defined by this
   MIB.

o State Objects - objects are automatically generated values which
   define the current operating state of the E-CDS process in the
   router.

o Performance Objects - objects are automatically generated values
   which help an administrator or automated tool to assess the
   performance of the CDS multicast process on the router and the
   overall multicasting performance within the MANET routing domain.

5. Structure of the MIB Module

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

o ecdsMIBNotifications - defines notifications that are associated
   with ECDS-MIB

o ecdsMIBObjects - defines objects as part of the structure of ECDS-
   MIB. These objects are divided as follows:

   * Configuration Group - this group contains ECDS objects that
      configure specific options that determine the overall operation
      of ECDS process.

   * State Group - this group contains ECDS objects that describe
      the state of the ECDS process.

   * Performance Group - this groups contains ECDS objects that help
      operators to characterize the performance of the ECDS process
      as configured.

o ecdsMIBConformance - defines minimal and full conformance of the
   implementations of this ECDS-MIB module.

5.1. Textual Conventions

   The textual conventions defined within the ECDS-MIB are as follows:

   o EcdsStatus - is defined within the ECDS-MIB. This contains the
      current operational status of the E-CDS process on an interface.

5.2. The Configuration Group

   The E-CDS device is configured with a set of controls. Some of the
   prominent configuration controls for the SMF E-CDS device follow:

   o E-CDS Operational Mode (ecdsAdminStatus) - indicates that the
      router has E-CDS enabled.

   o Router Identifier (ecdsRouterIDAddrType and ecdsRouterID) -
      indicates router's unique identifier in E-CDS neighborhood.

   o Router Priority (ecdsConfiguredRouterPriority) - indicates nodal
      metric value for all one-hop and two-hop neighbors.

   o Configuration method that computes Router Priority
      (ecdsConfiguredRtrPriMethod) - indicates what method the Router
      Priority is computed, i.e., dynamically configured, management
      configured, or other.

5.3. The State Group

   The state of an ECDS device can be retrieved from the following
   objects:

   o E-CDS Configuration State (ecdsOperationStatus) - a state that
      indicates whether or not the ECDS process is enabled or disabled
      on the node.

   o E-CDS Operational State (ecdsCurrentInEcds) - a state that
      indicates whether or not the node currently in or out of the Relay
      Set

   o E-CDS Current Router Priority Value (ecdsCurrentRtRPriValue) - the
      Router Priority that is currently assigned to the device.

5.4. The Performance Group

   The E-CDS performance counters consist of per node objects:

o   Counter of times the given node changed into or out of E-CDS
    (ecdsInEcdsChange).

o   Counter of times the Router Priority has been changed
    (ecdsCurrentRtrPriValueChange).

5.5. The Notifications Group

The Notifications Sub-tree contains the list of notifications
supported within the ECDS-MIB and their intended purpose or utility.
These include:

o   ecdsAdminStatusChange - this notification is sent when
    ecdsAdminStatus is changed.

o   ecdsConfiguredMemberChange - this notification is sent when
    cdsConfiguredMember is changed.

o   ecdsIfRtrPriChange - this notification is sent when ecdsIfRtrPri
    value is changed.

o   ecdsRtrPriMethodChange - this notification is sent when
    ecdsConfiguredRtrPriMethod is changed.

6. Relationship to Other MIB Modules

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 ECDS-MIB does not
duplicate those objects.

6.2. Relationship to the SMF-MIB

This ECDS-MIB module is an extension of the SMF-MIB module in the
sense previously discussed. To manage SMF router with ECDS-enabled,
both SMF-MIB and ECDS-MIB implementations are required.

6.3. MIB modules required for IMPORTS

The textual conventions imported for use in the SMF-MIB are as
follows:

o   The MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE, Counter32,
    Unsigned32, Integer32 and mib-2 textual conventions are imported
    from [RFC2578].

   o The TEXTUAL-CONVENTION, RowStatus and TruthValue textual
      conventions are imported from [RFC2579].

   o The MODULE-COMPLIANCE, OBJECT-GROUP and NOTIFICATION-GROUP textual
      conventions are imported from [RFC2580].

   o The InetAddress, InetAddressType and InetAddressPrefixLength
      textual conventions are imported from [RFC4001].

7. Definitions

 ECDS-MIB DEFINITIONS ::= BEGIN

 IMPORTS

         MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
         Counter32, Integer32, experimental
                 FROM SNMPv2-SMI   -- [RFC2578]

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

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

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

 manetEcdsMIB MODULE-IDENTITY
 LAST-UPDATED "201301021000Z" -- 2 January 2013
 ORGANIZATION "IETF MANET Working Group"
 CONTACT-INFO
 "WG E-Mail: manet@ietf.org

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 DESCRIPTION

         "This MIB module contains managed object definitions for the
          Manet E-CDS process defined in: [RFC5614]

          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
         REVISION "201301021000Z" -- 2 January 2013
         DESCRIPTION
                 "Initial version of this MIB module,
                  published as draft-nguyen-maney-ecds-mib-02.txt."
         ::= { experimental 9999 } -- to be assigned by IANA

 --
 -- TEXTUAL Conventions
 --

 EcdsStatus ::= TEXTUAL-CONVENTION
         STATUS   current
         DESCRIPTION
                 "An indication of the operability of a E-CDS function
                  or feature or example, the status of an node:

                  - 'enabled(1)' indicates that it is performing E-CDS
                    functions
                  - 'disabled(2)' indicates that it is not."
         SYNTAX INTEGER {
                     enabled (1),
                     disabled (2)
                 }

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

 ecdsMIBNotifications OBJECT IDENTIFIER ::= { manetEcdsMIB 0 }

```
ecdsMIBObjects OBJECT IDENTIFIER        ::= { manetEcdsMIB 1 }
ecdsMIBConformance OBJECT IDENTIFIER    ::= { manetEcdsMIB 2 }

--
-- ecdsMIBObjects Assignments:
-- ecdsConfigurationGroup       - 1
-- ecdsStateGroup               - 2
-- ecdsPerformanceGroup         - 3
--


--
-- ecdsConfigurationGroup
--
-- This group contains the E-CDS objects that configure specific
-- options that determine the overall performance and operation
-- of the multicast forwarding process for the router device
--


ecdsConfigurationGroup OBJECT IDENTIFIER ::= { ecdsMIBObjects 1 }

ecdsAdminStatus OBJECT-TYPE
        SYNTAX          EcdsStatus
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                "The configured status of the E-CDS process on this
                 device.

                   - Enabled(1) means that E-CDS is configured to run on
                     this device.
                   - Disabled(2) mean that the E-CDS process is
                     configured off.

                   This object is persistent and when written the entity
                   should save the change to non-volatile storage.

                   The default value of ecdsAdminStatus is disabled (2)."
        DEFVAL { disabled }
        ::= { ecdsConfigurationGroup 1 }

ecdsRouterIDAddrType    OBJECT-TYPE
        SYNTAX          InetAddressType
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
                "The address type of the address that is used for
                 'ecdsRouterID' of this router as specified in the
```

                    'ecdsRouterID' text.

                    Only ipv4(1) and ipv6(2) are supported.

                    ecdsRouterIDAddrType can be set by the management
                    station, the ecdsRouterID must be a routable address
                    assigned to this router. If the management station
                    does not assign this value then the router should
                    choose the highest routable IP address assigned to
                    this router. the default value of ecdsRouterAddrType
                    is ipv4.

                    This object is persistent and when written, the
                    entity should save the change to non-volatitle
                    storage."
          DEFVAL { ipv4 }
 ::= { ecdsConfigurationGroup 2 }

 ecdsRouterID   OBJECT-TYPE
          SYNTAX   InetAddress (SIZE(4|16))
          MAX-ACCESS   read-write
          STATUS   current
          DESCRIPTION
                    "The IP address used as the E-CDS router ID. This can
                     be set by the management station. If not explicitly
                     set, then the device should select a routable IP
                     address assigned to this router for use as the
                     'ecdsRouterID'. The ecdsRouterID is a logical
                     identification that must be consistent across
                     interoperating E-CDS neighborhoods and it is
                     recommended to be chosen as the numerically largest
                     address contained in a node's 'Neighbor Address List'
                     as defined in NHDP. A ecdsRouterID must be unique
                     within the scope of the operating MANET network
                     regardless of the method used for selecting it.

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

 ecdsConfiguredRtrPriMethod OBJECT-TYPE
          SYNTAX   INTEGER {
                        dynamicallyConfigured (1),
                        managementConfigured (2),
                        other (3)
                   }
          MAX-ACCESS   read-write
          STATUS   current

```
          DESCRIPTION
                  "This object indicates which method Router Priority
                   value is computed."
 ::= { ecdsConfigurationGroup 4 }

 ecdsConfiguredRouterPriority OBJECT-TYPE
          SYNTAX          Integer32
          MAX-ACCESS      read-write
          STATUS          current
          DESCRIPTION
                  "a nodal metric for all 1-hop and 2-hop neighbors.
                   Relay routers use tuple of router identifier and
                   router priority to compute self-election of MPR."
 ::= { ecdsConfigurationGroup 5 }

 ecdsConfiguredMember OBJECT-TYPE
          SYNTAX   INTEGER {
                          potential(1),
                          always(2),
                          never(3)
                  }
          MAX-ACCESS      read-write
          STATUS          current
          DESCRIPTION
                  "The E-CDS downselects a set of forwarders for
                   multicast forwarding. Sometimes, it is useful to force
                   an agent to be included or excluded from the resulting
                   CDS. This object is a switch to allow for this
                   behavior.

                    - The value potential(1) allows the selected E-CDS
                      to determine if this agent is included or
                      excluded from the E-CDS.

                    - The value always(1) forces the selected E-CDS
                      process

                    - The value never(3) forces not to use E-CDS process

                    - The default setting for this object is
                      'potential(1)'.  Other settings could pose
                      operational risks under certain conditions.

                   This object is persistent and when written the entity
                   should save the change to non-volatile storage."
          DEFVAL { potential }
 ::= { ecdsConfigurationGroup 6 }
```

```
--
-- E-CDS State Group
--

ecdsStateGroup OBJECT IDENTIFIER ::= { ecdsMIBObjects 2 }

ecdsOperationStatus OBJECT-TYPE
        SYNTAX          EcdsStatus
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                "The configured status of the E-CDS process on this
                 device.

                 - enabled(1) means that E-CDS is configured to run on
                   this device.

                 - disabled(2) mean that the E-CDS process is
                   configured off.

                 This object is persistent and when written the entity
                 should save the change to non-volatile storage.

                 The default value of ecdsOperationStatus is
                 disabled (2)."
        DEFVAL { disabled }
::= { ecdsStateGroup 1 }


ecdsCurrentRtrPriValue OBJECT-TYPE
        SYNTAX          Integer32
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                "current Router Priority value"
::= { ecdsStateGroup 2 }

ecdsCurrentInEcds OBJECT-TYPE
        SYNTAX          TruthValue
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
                "This object indicates that the current node has E-CDS
                 configured and in E-CDS. true(1) means the router has
                 E-CDS configured or false(2) otherwise."
::= { ecdsStateGroup 3 }
```

```
 --
 -- E-CDS Performance Group
 --

 ecdsPerformanceGroup OBJECT IDENTIFIER ::= { ecdsMIBObjects 3 }

 ecdsInEcdsChange OBJECT-TYPE
         SYNTAX          Counter32
         MAX-ACCESS      read-only
         STATUS          current
         DESCRIPTION
                 "This object indicates how many times the current
                  node is configured to be in E-CDS."
 ::= { ecdsPerformanceGroup 1 }


 ecdsCurrentRtrPriValueChange OBJECT-TYPE
         SYNTAX          Counter32
         MAX-ACCESS      read-only
         STATUS          current
         DESCRIPTION
                 "This object indicates how many times the Router
                  Priority of the current node has been changed."
 ::= { ecdsPerformanceGroup 2 }

 --
 -- E-CDS Notification
 --

 ecdsMIBNotifObjects OBJECT IDENTIFIER   ::= { ecdsMIBNotifications 0 }

 --
 -- E-CDS Notification Objects
 --

 ecdsAdminStatusChange NOTIFICATION-TYPE
         OBJECTS {
                 ecdsRouterID,         -- the originator of notification
                 ecdsRouterIDAddrType, -- the originator of notification
                 ecdsAdminStatus       -- the new status of E-CDS
                                       --    process
         }
         STATUS          current
         DESCRIPTION
                 "ecdsAdminStatusChange notification is sent when
                  ecdsAdminStatus is changed."
 ::= { ecdsMIBNotifObjects 1 }
```

 ecdsConfiguredMemberChange NOTIFICATION-TYPE
         OBJECTS {
                 ecdsRouterID,   -- the originator of notification
                 ecdsRouterIDAddrType, -- the originator of notification
                 ecdsConfiguredMember -- the indication of being
                                       --   included from E-CDS process
         }
         STATUS   current
         DESCRIPTION
                 "ecdsConfiguredMemberChange notification is sent when
                  ecdsConfiguredMember is changed."
 ::= { ecdsMIBNotifObjects 2 }

 ecdsRtrPriChange NOTIFICATION-TYPE
         OBJECTS {
                 ecdsRouterID,   -- the originator of
                                                --   notification
                 ecdsRouterIDAddrType,   -- the originator of
                                                --   notification
                 ecdsConfiguredRouterPriority -- the priority value
         }
         STATUS   current
         DESCRIPTION
                 "ecdsIfRtrPriChange notification is sent when
                  ecdsIfRtrPri value is changed."
 ::= { ecdsMIBNotifObjects 3 }

 ecdsRtrPriMethodChange NOTIFICATION-TYPE
         OBJECTS {
                 ecdsRouterID,   -- the originator of
                                            --   notification
                 ecdsRouterIDAddrType,   -- the originator of
                                            --   notification
                 ecdsConfiguredRtrPriMethod -- the method is used to
                                            --   calculate router
                                            --   priority
         }
         STATUS   current
         DESCRIPTION
                 "ecdsRtrPriMethodChange notification is sent when
                  ecdsConfiguredRtrPriMethod is changed."
 ::= { ecdsMIBNotifObjects 4 }

 --
 -- Compliance Statements
 --

 ecdsCompliances OBJECT IDENTIFIER ::= { ecdsMIBConformance 1 }

```
 ecdsMIBGroups    OBJECT IDENTIFIER  ::= { ecdsMIBConformance 2 }

 ecdsBasicCompliance MODULE-COMPLIANCE
         STATUS          current
         DESCRIPTION
                 "The basic implementation requirements for managed
                  network entities that implement the E-CDS process."
         MODULE -- this module
         MANDATORY-GROUPS {
                 ecdsConfigurationComplianceGroup
         }
 ::= { ecdsCompliances 1 }

 ecdsFullCompliance MODULE-COMPLIANCE
         STATUS          current
         DESCRIPTION
                 "The full implementation requirements for managed
                  network entities that implement the E-CDS process."
         MODULE -- this module
         MANDATORY-GROUPS {
                 ecdsConfigurationComplianceGroup,
                 ecdsStateComplianceGroup,
                 ecdsPerformanceComplianceGroup,
                 ecdsNotificationsComplianceGroup
         }
 ::= { ecdsCompliances 2 }

 ecdsConfigurationComplianceGroup OBJECT-GROUP
         OBJECTS {
                 ecdsAdminStatus,
                 ecdsRouterID,
                 ecdsRouterIDAddrType,
                 ecdsConfiguredRouterPriority,
                 ecdsConfiguredMember,
                 ecdsConfiguredRtrPriMethod
         }
         STATUS          current
         DESCRIPTION
                 "Set of configuration objects implemented in this
                  module"
 ::= { ecdsMIBGroups 1 }

 ecdsStateComplianceGroup OBJECT-GROUP
         OBJECTS {
                 ecdsOperationStatus,
                 ecdsCurrentRtrPriValue,
                 ecdsCurrentInEcds
         }
```

```
        STATUS          current
        DESCRIPTION
                "set of state objects implemented in this module"
 ::= { ecdsMIBGroups 2 }


 ecdsPerformanceComplianceGroup OBJECT-GROUP
        OBJECTS {
                ecdsInEcdsChange,
                ecdsCurrentRtrPriValueChange
        }
        STATUS          current
        DESCRIPTION
                "set of performance objects implemented in this
                 module"
 ::= { ecdsMIBGroups 3 }


 ecdsNotificationsComplianceGroup NOTIFICATION-GROUP
        NOTIFICATIONS {
                ecdsAdminStatusChange,
                ecdsConfiguredMemberChange,
                ecdsRtrPriChange,
                ecdsRtrPriMethodChange
        }
        STATUS          current
        DESCRIPTION
                "set of notification objects implemented in this
                 module"
 ::= { ecdsMIBGroups 4 }

 END
```


8. Security Considerations

This section discusses security implications of the choices made in
this ECDS-MIB module.

There are a number of management objects defined in this MIB module
with MAX-ACCESS clause of read-write and/or read-create. Such
objects maybe considered sensitive or vulnerable in some network
environments. The support of SET operations in a non-secure
environment without proper protection can have a negative effect on
network operations. These are objects and their sensitivity/
vulnerability:

o ecdsAdminStatus - this writable configuration object controls the
   operational status of the SMF ECDS process. If this setting is
   configured inconsistently across the MANET multicast domain, then

the delivery of multicast data maybe also be inconsistent across
the domain.

o ecdsRouterIDAddrType and ecdsRouterID - these writable
   configuration objects define the identifier (ID) of the SMF E-CDS
   process. These objects should be configured with a routable
   address defined on the local SMF E-CDS device. The ecdsRouterID
   is the logical identification that must be consistent across
   interoperating SMF E-CDS neighborhoods. The ecdsRouterID is
   recommended to be chosen as the numerically largest address
   contained in a node's 'Neighbor Address List' as defined in NHDP
   [RFC6130].

o ecdsConfiguredRtrPriMethod - this writable configuration object
   indicates how the value of Router Priority is computed.

o ecdsConfiguredRouterPriority - this writable configuration object
   indicates a nodal metric for all 1-hop and 2-hop neighbors. Relay
   routers use tuple of router identifier and router priority to
   compute self-election of MPR.

o ecdsConfiguredMember - this writable configuration object defines
   a set of forwarders for multicast forwarding. Sometimes, it is
   useful to force an agent to be included or excluded from the
   resulting CDS. This object is a switch to allow for this
   behavior. Mis-configuration of the object may cause the MANET
   flooding to break due to logical splits in the topology.

9. Applicability Statement

This document describes objects for configuring Essential Connected
Dominating Set (E-CDS) process parameters on a router. This MIB
module, denoted ECDS-MIB module, also reports state, performance
information and notifications. Since it is an extension of SMF-MIB
module, the same applicability examples can be found in SMF-MIB
draft.

10. IANA Considerations

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

```
        Descriptor        OBJECT IDENTIFIER value
        ----------        -----------------------
        ECDS-MIB          { experimental 9999 }
        IANA EDITOR NOTE: please assign 9999
```

11. Contributors

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

12. Acknowledgements

The authors would like to acknowledge the valuable comments from
Ulrich Herberg in the early phases of the development of this MIB-
module. Further, the authors would like to acknowledge to work of
Brian Little and Ryan Morgan on their software development of the
ECDS-MIB.

13. Change Log

This section tracks the revision history in the development of this
ECDS-MIB. It will be removed from the final version of this
document.

These changes were made from draft-nguyen-manet-ecds-mib-01 to
draft-nguyen-manet-ecds-mib-02:

1. Added references, applicability statement, security
    considerations, IANA considerations, acknowledgment.

2. Added ecdsRouterIDAddrType object to go along with ecdsRouterID

These changes were made from draft-nguyen-manet-ecds-mib-00 to
draft-nguyen-manet-ecds-mib-01:

1. Initial draft

14. Open Issues

This section contains the set of open issues related to the
development and design of the ECDS-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. Does this MIB module need to include the MDR Level as a state
    object?

2. Within the Security Section, we need to include a discussion of
    the problems caused by mis-configuring the ecdsRouterID, the
    ecdsConfigured RtrPriMethod, and the ecdsConfiguredRouterPriority
    objects.

3. Once the SMF-MIB module is published, the references to the RFC
    must be updated.

4. A careful review by the working group.

15. Title

```
*******************************************************************
* 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.                                 *
*                                                             *
*******************************************************************
```

16. References

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