Inter-Domain Multicast Routing (IDMR)
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Core Based Trees (CBT) Multicast Routing MIB
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Abstract

This memo defines an experimental portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. More precisely, it describes managed objects specific to the Core Based Trees (CBT) multicast routing protocol version 2 [5]. Managed objects which are common to all multicast routing protocols, including CBT, can be found in [6].

This MIB module is applicable to IP multicast routers which implement CBTv2.

1. Introduction

This memo defines an experimental portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. More precisely, it describes managed objects specific to the

Core Based Trees (CBT) multicast routing protocol version 2 [5]. Managed objects which are common to all multicast routing protocols, including CBT, can be found in [6].

This MIB module is applicable to IP multicast routers which implement CBTv2.

2. The SNMPv2 Network Management Framework

The SNMPv2 Network Management Framework presently consists of three major components. They are:

- RFC 1902 [1] defines the structure of management information (SMI) for SNMPv2. This deals with the mechanisms used for describing and naming objects for the purpose of management.

- STD 17, RFC 1213 [2] defines MIB-II, the core set of managed objects for the Internet suite of protocols.

- RFC 1157 [3] and RFC 1905 [4] define two versions of the protocol used for network access to managed objects. This protocol is called the "Simple Network Management Protocol".

The Framework permits new objects to be defined for the purpose of experimentation and evaluation.

2.1. Object Definitions

Managed objects are accessed via a virtual information store, known as the Management Information Base or MIB. Objects in the MIB are defined using a subset of the Abstract Syntax Notation One (ASN.1) data definition language; this subset is defined in the SMI [1]. Each object type is named by an Object Identifier - an administratively assigned name. The object type together with an object instance serves to uniquely identify a specific instantiation of the object.

3. Overview

This MIB controls all aspects of the CBT protocol. It consists of five groups:

- The cbtGeneralGroup is used to describe general configuration information for all CBT routers.

- The cbtInterfaceGroup is used to describe interface configuration and statistics.

- The cbtBootstrapGroup is used to describe information relating to auto-bootstrapping for core discovery.

- The cbtStaticMappingGroup is used to describe static <core,group> mappings when auto-bootstrapping is not in use.

- The cbtBorderGroup is used to describe configuration information for CBT border routers.

4. Definitions

```
CBT-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, experimental,
    Integer32, IpAddress, TimeTicks  FROM SNMPv2-SMI
    RowStatus, TruthValue            FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP  FROM SNMPv2-CONF;

cbtMIB MODULE-IDENTITY
    LAST-UPDATED "9706041500Z"
    ORGANIZATION "IETF IDMR Working Group."
    CONTACT-INFO
       " Tony Ballardie,
         Research Consultant,

         EMail: ABallardie@acm.org"
    DESCRIPTION
       "The MIB module for management of CBT routers."
    ::= { experimental XX }

cbtMIBObjects OBJECT IDENTIFIER ::= { cbtMIB 1 }

cbt         OBJECT IDENTIFIER ::= { cbtMIBObjects 1 }

--
--  The CBT General Group
--

cbtCoreDiscoveryMethod OBJECT-TYPE
    SYNTAX     INTEGER {
                  static(1),    -- using static <core,group> configuration
                  bootstrap(2)  -- using bootstrap for core discovery
               }
    MAX-ACCESS read-write
    STATUS     current
    DESCRIPTION
            "Indicates which method this CBT router is using for core
            discovery.  Note that all routers in the CBT domain must use
            the same method."
    ::= { cbt 3 }
```

```
--
-- The CBT Interface Group
--

cbtInterfaceTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF CbtInterfaceEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The (conceptual) table listing the router's CBT interfaces.
            CBT is enabled on all interfaces listed in this table."
    ::= { cbt 4 }

cbtInterfaceEntry OBJECT-TYPE
    SYNTAX     CbtInterfaceEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) in the cbtInterfaceTable."
    INDEX      { cbtInterfaceIfIndex }
    ::= { cbtInterfaceTable 1 }

CbtInterfaceEntry ::= SEQUENCE {
    cbtInterfaceIfIndex          Integer32,
    cbtInterfaceAddress          IpAddress,
    cbtInterfaceDR               IpAddress,
    cbtInterfaceHelloPreference  Integer32,
    cbtInterfaceHelloInterval    Integer32,
    cbtInterfaceStatus           RowStatus
}

cbtInterfaceIfIndex OBJECT-TYPE
    SYNTAX     Integer32
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The ifIndex value of this CBT interface."
    ::= { cbtInterfaceEntry 1 }

cbtInterfaceAddress OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The IP address of the CBT interface."
```

```
    ::= { cbtInterfaceEntry 2 }

cbtInterfaceDR OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The Designated Router's address on this CBT interface.  For
            point-to-point interfaces, this object has the value
            0.0.0.0.  If the local router is the DR, then the value will
            be equal to cbtInterfaceAddress."
    ::= { cbtInterfaceEntry 5 }

cbtInterfaceHelloPreference OBJECT-TYPE
    SYNTAX     Integer32 (1..255)
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "This router's configured Hello preference value on this
            interface. This object does not report the preference value
            currently in use by the DR, which is always zero."
   DEFVAL      { 255 }
    ::= { cbtInterfaceEntry 6 }

cbtInterfaceHelloInterval OBJECT-TYPE
    SYNTAX     Integer32
    UNITS      "seconds"
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "The frequency at which CBT HELLO messages are transmitted
            on this CBT interface."
    DEFVAL     { 60 }
    ::= { cbtInterfaceEntry 7 }

cbtInterfaceStatus OBJECT-TYPE
    SYNTAX     RowStatus
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "The status of this entry.   Creating the entry enables CBT
            on the interface; destroying the entry disables CBT on the
            interface."
    ::= { cbtInterfaceEntry 10 }
```

```
--
--  The CBT Bootstrap Group
--

cbtBSRAddress OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The IP address of the bootstrap router (BSR) for the local
            CBT region."
    ::= { cbt 8 }

cbtBSRExpiryTime OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The minimum time remaining before the bootstrap router will
            be declared down. For candidate BSRs, this is the time until
            it sends an Core-Set message. For other routers, this is the
            time until it may accept an Core-Set message from a lower
            candidate BSR."
    ::= { cbt 9 }

cbtCandidateBSRPreference OBJECT-TYPE
    SYNTAX     Integer32 (-1..255)
    MAX-ACCESS read-write
    STATUS     current
    DESCRIPTION
            "The preference value for the local system as a candidate
            bootstrap router.  The value of -1 is used to indicate that
            the local system is not a candidate BSR."
    ::= { cbt 10 }

cbtCandidateCoreHoldTime OBJECT-TYPE
    SYNTAX     Integer32 (0..255)
    UNITS      "seconds"
    MAX-ACCESS read-write
    STATUS     current
    DESCRIPTION
            "The holdtime of the local system when it is a candidate
            Core.  The value of 0 is used to indicate that the local
            system is not a Candidate-Core."
    ::= { cbt 11 }
```

```
-- The CBT Core-Set Table

cbtCoreSetTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF CbtCoreSetEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The (conceptual) table listing CBT information for
            candidate Core routers for IP multicast groups.  When the
            local router is the BSR, this information is obtained from
            received Candidate-Core-Advertisements.  When the local
            router is not the BSR, this information is obtained from
            received Core-Set messages."
    ::= { cbt 5 }

cbtCoreSetEntry OBJECT-TYPE
    SYNTAX     CbtCoreSetEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) in the cbtCoreSetTable."
    INDEX      { cbtCoreSetGroupAddress, cbtCoreSetGroupMask,
       cbtCoreSetAddress }
    ::= { cbtCoreSetTable 1 }

CbtCoreSetEntry ::= SEQUENCE {
    cbtCoreSetGroupAddress  IpAddress,
    cbtCoreSetGroupMask     IpAddress,
    cbtCoreSetAddress       IpAddress,
    cbtCoreSetHoldTime      Integer32,
    cbtCoreSetExpiryTime    TimeTicks
}

cbtCoreSetGroupAddress OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The IP multicast group address which, when combined with
            cbtCoreSetGroupMask, gives the group prefix for which this
            entry contains information about the Candidate-Core."
    ::= { cbtCoreSetEntry 1 }

cbtCoreSetGroupMask OBJECT-TYPE
    SYNTAX     IpAddress
```

```
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The multicast group address mask which, when combined with
            cbtCoreSetGroupAddress, gives the group prefix for which
            this entry contains information about the Candidate-Core."
    ::= { cbtCoreSetEntry 2 }

cbtCoreSetAddress OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The IP address of the Candidate-Core."
    ::= { cbtCoreSetEntry 3 }

cbtCoreSetHoldTime OBJECT-TYPE
    SYNTAX     Integer32 (0..255)
    UNITS      "seconds"
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The holdtime of a Candidate-Core.  If the local router is
            not the BSR, this value is 0."
    ::= { cbtCoreSetEntry 4 }

cbtCoreSetExpiryTime OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The minimum time remaining before the Candidate-Core will
            be declared down.  If the local router is not the BSR, this
            value is 0."
    ::= { cbtCoreSetEntry 5 }


-- The CBT Candidate-Core Table

cbtCandidateCoreTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF CbtCandidateCoreEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The (conceptual) table listing the IP multicast groups for
```

```
            which the local router is to advertise itself as a
            Candidate-Core when the value of cbtCandidateCoreHoldTime is
            non-zero.  If this table is empty, then the local router
            will advertise itself as a Candidate-Core for all groups
            (providing the value of cbtCandidateCoreHoldTime is non-
            zero)."
    ::= { cbt 6 }

cbtCandidateCoreEntry OBJECT-TYPE
    SYNTAX     CbtCandidateCoreEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) in the cbtCandidateCoreTable."
    INDEX { cbtCandidateCoreGroupAddress,
            cbtCandidateCoreGroupMask }
    ::= { cbtCandidateCoreTable 1 }

CbtCandidateCoreEntry ::= SEQUENCE {
    cbtCandidateCoreGroupAddress   IpAddress,
    cbtCandidateCoreGroupMask   IpAddress,
    cbtCandidateCoreAddress     IpAddress,
    cbtCandidateCoreRowStatus   RowStatus
}

cbtCandidateCoreGroupAddress OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The IP multicast group address which, when combined with
            cbtCandidateCoreGroupMask, identifies a group prefix for
            which the local router will advertise itself as a
            Candidate-Core."
    ::= { cbtCandidateCoreEntry 1 }

cbtCandidateCoreGroupMask OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The multicast group address mask which, when combined with
            cbtCandidateCoreGroupMask, identifies a group prefix for
            which the local router will advertise itself as a
            Candidate-Core."
```

```
    ::= { cbtCandidateCoreEntry 2 }

cbtCandidateCoreAddress OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "The (unicast) address of the interface which will be
            advertised as a Candidate-Core."
    ::= { cbtCandidateCoreEntry 3 }

cbtCandidateCoreRowStatus OBJECT-TYPE
    SYNTAX     RowStatus
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "The status of this row, by which new entries may be
            created, or old entries deleted from this table."
    ::= { cbtCandidateCoreEntry 4 }
```

```
--
--  The CBT Static Mapping Group
--

-- CBT Static Core Mapping Table

cbtStaticCoreTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF CbtStaticCoreEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "The (conceptual) table containing <core,group> mappings."
    ::= { cbt 7 }

cbtStaticCoreEntry OBJECT-TYPE
    SYNTAX     CbtStaticCoreEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) containing <group, core> mapping
            information."
    INDEX { cbtCoreGroupAddress,
            cbtCoreGroupMask }
    ::= { cbtStaticCoreTable 1}

CbtStaticCoreEntry ::= SEQUENCE {
    cbtCoreGroupAddress  IpAddress,
    cbtCoreGroupMask     IpAddress,
    cbtCoreAddress       IpAddress,
    cbtCoreRowStatus     RowStatus
}

cbtCoreGroupAddress OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "IP class D (group) address."
    ::= { cbtStaticCoreEntry 1 }

cbtCoreGroupMask OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
```

```
            "Network mask covering group address to represent a
            contiguous range of group addresses associated with a
            particular core router."
    ::= { cbtStaticCoreEntry 2 }

cbtCoreAddress OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "IP address of core router for the given group(s)."
    ::= { cbtStaticCoreEntry 3 }

cbtCoreRowStatus OBJECT-TYPE
    SYNTAX     RowStatus
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
            "The status of this row, by which entries may be created or
            deleted from this table."
    ::= { cbtStaticCoreEntry 4 }
```

```
--
-- The CBT Border Group
--

cbtBorderRouterAddress OBJECT-TYPE
    SYNTAX     TruthValue
    MAX-ACCESS read-write
    STATUS     current
    DESCRIPTION
            "The IP address which the router is using as the source
            address in BR_HELLO messages."
    ::= { cbt 1 }

cbtDesignatedBR OBJECT-TYPE
    SYNTAX     IpAddress
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The IP address of the domain's designated border router."
    ::= { cbt 2 }

cbtBRHelloPreference OBJECT-TYPE
    SYNTAX     Integer32 (0..255)
    MAX-ACCESS read-write
    STATUS     current
    DESCRIPTION
            "This router's preference value for BR Hello messages. This
            object does not report the DBR preference value, which is
            zero.  A value of 0 indicates that the router is not acting
            as a border router."
    ::= { cbt 12 }
```

```
-- conformance information

cbtMIBConformance
                  OBJECT IDENTIFIER ::= { cbtMIB 2 }
cbtMIBCompliances
                  OBJECT IDENTIFIER ::= { cbtMIBConformance 1 }
cbtMIBGroups  OBJECT IDENTIFIER ::= { cbtMIBConformance 2 }


-- compliance statements

cbtRouterMIBCompliance MODULE-COMPLIANCE
    STATUS  current
    DESCRIPTION
            "The compliance statement for routers running CBTv2, and
            implementing the CBT MIB."
    MODULE  -- this module
         MANDATORY-GROUPS { cbtGeneralGroup, cbtInterfaceGroup }

       OBJECT     cbtInterfaceStatus
       MIN-ACCESS read-only
       DESCRIPTION
            "Write access is not required."

       GROUP      cbtBootstrapGroup
       DESCRIPTION
            "The cbtBootstrapGroup is mandatory only for those CBTv2
            routers which implement auto-bootstrap for Core Discovery."

       GROUP      cbtStaticMappingGroup
       DESCRIPTION
            "The cbtBootstrapGroup is mandatory only for those CBTv2
            routers which implement static <core,group> mappings."

       GROUP      cbtBorderGroup
       DESCRIPTION
            "The cbtBorderGroup is mandatory only for those CBTv2
            routers which implement multicast border router
            functionality."
    ::= { cbtMIBCompliances 1 }

-- units of conformance

cbtGeneralGroup OBJECT-GROUP
    OBJECTS { cbtCoreDiscoveryMethod }
```

```
    STATUS  current
    DESCRIPTION
            "A collection of objects to support management of general
            CBT configuration information."
    ::= { cbtMIBGroups 1 }

cbtInterfaceGroup OBJECT-GROUP
    OBJECTS { cbtInterfaceAddress, cbtInterfaceDR,
              cbtInterfaceHelloPreference,
              cbtInterfaceHelloInterval,
              cbtInterfaceStatus }
    STATUS  current
    DESCRIPTION
            "A collection of objects to support management of CBT
            interfaces."
    ::= { cbtMIBGroups 2 }

cbtBorderGroup OBJECT-GROUP
    OBJECTS { cbtBorderRouterAddress, cbtDesignatedBR,
              cbtBRHelloPreference }
    STATUS  current
    DESCRIPTION
            "A collection of objects to support management of CBT border
            routers."
    ::= { cbtMIBGroups 3 }

cbtBootstrapGroup OBJECT-GROUP
    OBJECTS { cbtBSRAddress, cbtBSRExpiryTime,
              cbtCandidateBSRPreference, cbtCandidateCoreHoldTime,
              cbtCoreSetHoldTime, cbtCoreSetExpiryTime,
              cbtCandidateCoreAddress, cbtCandidateCoreRowStatus }
    STATUS  current
    DESCRIPTION
            "A collection of objects to support management of
            information relating to auto-bootstrap as the core discovery
            mechanism."
    ::= { cbtMIBGroups 4 }

cbtStaticMappingGroup OBJECT-GROUP
    OBJECTS { cbtCoreAddress, cbtCoreRowStatus }
    STATUS  current
    DESCRIPTION
            "A collection of objects to support management of
            information relating to static configuration as the core
            discovery mechanism."
```

```
    ::= { cbtMIBGroups 5 }

END
```

5. Security Considerations

Security issues are not discussed in this memo.

6. Acknowledgements

Thanks to James Cowan for his review and comments.

7. References

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[2] McCloghrie, K., and M. Rose, Editors, "Management Information Base for Network Management of TCP/IP-based internets: MIB-II", STD 17, RFC 1213, March 1991.

[3] Case, J., Fedor, M., Schoffstall, M., and J. Davin, "Simple Network Management Protocol", RFC 1157, May 1990.

[4] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Protocol Operations for version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1905, January 1996.

[5] A. Ballardie, "Core Based Trees (CBT version 2) Multicast Routing: Protocol Specification", Working Draft, April 1997.

[6] McCloghrie, K., Farinacci, D., and D. Thaler, "IP Multicast Routing MIB", Working draft, draft-ietf-idmr-multicast-routmib-05.txt, March 1997.

8. Authors' Addresses

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