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Definitions of Managed Objects for MAP-E
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Abstract

This memo defines a portion of the Management Information Base (MIB) for using with network management protocols in the Internet community. In particular, it defines managed objects for MAP encapsulation mode.

Table of Contents

1.	Introduction	3
2.	The Internet-Standard Management Framework	3
3.	Terminology	3
4.	Structure of the MIB Module	3
4.1.	The mapMIBObjects	4
4.1.1.	The mapRule Subtree	4
4.1.2.	The mapSecurityCheck Subtree	4
4.2.	The mapMIBConformance Subtree	4
5.	Definitions	4
6.	IANA Considerations	12
7.	Security Considerations	12
8.	Acknowledgments	12
9.	References	12
9.1.	Normative References	12
9.2.	Informative References	13
10.	Change Log [RFC Editor please remove]	13
	Author's Addresses	14

1. Introduction

MAP [I-D. [draft-ietf-softwire-map](#)] is a stateless mechanism for running IPv4 over IPv6-only infrastructure. In particular, it includes two mode, translation mode or encapsulation mode. For the encapsulation mode, it provides an automatic tunnelling mechanism for providing IPv4 connectivity service to end users over a service provider's IPv6 network.

This document defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. This MIB module may be used for monitoring the devices in the MAP scenario, especially, for the encapsulation mode.

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 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 [\[RFC2578\]](#), [\[RFC2579\]](#) and [\[RFC2580\]](#).

3. Terminology

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. Structure of the MIB Module

The MAP-E MIB provides a way to configure and manage the devices in MAP encapsulation mode through SNMP.

MAP-E MIB is configurable on a per-interface basis. It depends on several parts of the IF-MIB [\[RFC2863\]](#).

[4.1.](#) The mapMIBObjects

[4.1.1.](#) The mapRule Subtree

The mapRule subtree describes managed objects used for managing the multiple mapping rules in the MAP encapsulation mode.

According to the MAP specification, the mapping rules are divided into two categories, which are BMR (Basic Mapping Rule), and FMR (Forwarding Mapping Rule).

[4.1.2.](#) The mapSecurityCheck Subtree

The mapSecurityCheck subtree is to statistic the number of invalid packets that been identified. There are two kind of invalid packets which are defined in the MAP specification as the following.

- The BR MUST perform a validation of the consistency of the source IPv6 address and source port number for the packet using BMR.
- The CE SHOULD check that MAP received packets' transport-layer destination port number is in the range configured by MAP for the CE.

[4.2.](#) The mapMIBConformance Subtree

The mapMIBConformance subtree provides conformance information of MIB objects.

[5.](#) Definitions

```
MAP-E-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, mib-2, transmission,
    Gauge32, Integer32, Counter64
        FROM SNMPv2-SMI --[RFC2578]

    RowStatus, StorageType, DisplayString
        FROM SNMPv2-TC --[RFC2579]

    ifIndex, InterfaceIndexOrZero
        FROM IF-MIB --[RFC2863]

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

OBJECT-GROUP, MODULE-COMPLIANCE,
NOTIFICATION-GROUP
FROM SNMPv2-CONF; -- [[RFC2580](#)]

mapMIB MODULE-IDENTITY

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DESCRIPTION

"The MIB module is defined for management of objects in the
MAP-E BRs or CEs."

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```
 ::= { transmission xxx } --xxx to be replaced with
IANA-assigned value

mapMIBObjects OBJECT IDENTIFIER ::= {mapMIB 1}

mapRule OBJECT IDENTIFIER
 ::= { mapMIBObjects 1 }

mapSecurityCheck OBJECT IDENTIFIER
 ::= { mapMIBObjects 2 }

mapRuleTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF mapRuleEntry
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The (conceptual) table containing rule Information of
        specific mapping rule. It can also be used for row
        creation."
    ::= { mapRule 1 }

mapRuleEntry OBJECT-TYPE
    SYNTAX      MapRuleEntry
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "Each entry in this table contains the information on a
        particular mapping rule."
    INDEX      { mapRuleID }
    ::= { mapRuleTable 1 }

mapRuleEntry ::=
    SEQUENCE {
        mapRuleID                      Integer32,
        mapRuleIPv6PrefixType          InetAddressType,
        mapRuleIPv6Prefix              InetAddress,
        mapRuleIPv6PrefixLen           InetAddressPrefixLength,
        mapRuleIPv4PrefixType          InetAddressType,
        mapRuleIPv4Prefix              InetAddress,
        mapRuleIPv4PrefixLen           InetAddressPrefixLength,
        mapRuleStartPort               InetPortNumber,
        mapRuleEndPort                 InetPortNumber,
        mapRuleEALen                   Integer32,
        mapRuleStatus                  RowStatus,
        mapRuleStorageType              StorageType,
```



```
        mapRuleType                Integer32
    }

mapRuleID OBJECT-TYPE
    SYNTAX Integer32 (1..2147483647)
    MAX-ACCESS read-create
    STATUS current
    DESCRIPTION
        "An identifier used to distinguish the multiple mapping
        rule which is unique with each CE in the same BR."
    ::= { mapRuleEntry 1 }

mapRuleIPv6PrefixType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS read-create
    STATUS      current
    DESCRIPTION
        "In this object, it MUST be set to the value of 2 to
        present IPv6 type. It complies the textule convention
        of IPv6 address defined in [RFC4001]."
    ::= { mapRuleEntry 2 }

mapRuleIPv6Prefix OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS read-create
    STATUS      current
    DESCRIPTION
        "The IPv6 prefix defined in mapping rule which will be
        assigned to CE ."
    ::= { mapRuleEntry 3 }

mapRuleIPv6PrefixLen OBJECT-TYPE
    SYNTAX      InetAddressPrefixLength
    MAX-ACCESS read-create
    STATUS      current
    DESCRIPTION
        "The length of the IPv6 prefix defined in the mapping rule.
        As a parameter for mapping rule, it will be also assigned
        to CE."
    ::= { mapRuleEntry 4 }

mapRuleIPv4PrefixType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS read-create
    STATUS      current
    DESCRIPTION
        "In this object, it MUST be set to the value of 1 to
```


present IPv4 type. It complies the textual convention of IPv6 address defined in [[RFC4001](#)]."

```
::= { mapRuleEntry 5 }
```

mapRuleIPv4Prefix OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-create

STATUS current

DESCRIPTION

" The IPv4 prefix defined in mapping rule which will be assigned to CE."

```
::= { mapRuleEntry 6 }
```

mapRuleIPv4PrefixLen OBJECT-TYPE

SYNTAX InetAddressPrefixLength

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The length of the IPv4 prefix defined in the mapping rule. As a parameter for mapping rule, it will be also assigned to CE."

```
::= { mapRuleEntry 7 }
```

mapRuleStartPort OBJECT-TYPE

SYNTAX InetPortNumber

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The start port number of the port range derived from the mapping rule which will be assigned to CE."

```
::= { mapRuleEntry 8 }
```

mapRuleEndPort OBJECT-TYPE

SYNTAX InetPortNumber

MAX-ACCESS read-create

STATUS current

DESCRIPTION

" The end port number of the port range derived from the mapping rule which will be assigned to CE."

```
::= { mapRuleEntry 9 }
```

mapRuleEALen OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The length of the Embedded-Address (EA) defined in

mapping rule which will be assigned to CE."
 ::= { mapRuleEntry 10 }

mapRuleStatus 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."
 ::= { mapRuleEntry 11 }

mapRuleStorageType OBJECT-TYPE
SYNTAX StorageType
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The storage type of this row. If the row is
permanent(4), no objects in the row need be
writable."
 ::= { mapRuleEntry 12 }

mapRuleType OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The type of the mapping rule. A value of 0 means it
is a BMR; a non-zero value means it is a FMR."
 ::= { mapRuleEntry 12 }

mapSecurityCheckTable OBJECT-TYPE
SYNTAX SEQUENCE OF MapSecurityCheckEntry
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The (conceptual) table containing information on
MAP security checks. This table can be used to statistic
the number of invalid packets that been identified"
 ::= { mapSecurityCheck 1 }

mapSecurityCheckEntry OBJECT-TYPE
SYNTAX mapSecurityCheckEntry
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Each entry in this table contains the information on a


```
        particular MAP SecurityCheck."
    INDEX    { mapSecurityCheckInvalidv4,
               mapSecurityCheckInvalidv6}
 ::= { mapSecurityCheckTable 1 }

mapSecurityCheckEntry ::=
    SEQUENCE {
        mapSecurityCheckInvalidv4      Counter64,
        mapSecurityCheckInvalidv6      Counter64,
        mapSecurityCheckStatus          RowStatus,
        mapSecurityCheckStorageType     StorageType
    }

mapSecurityCheckInvalidv4 OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The CE SHOULD check that MAP received packets'
        transport-layer destination port number is in the range
        configured by MAP for the CE"
    ::= { mapSecurityCheckEntry 1 }

mapSecurityCheckInvalidv6 OBJECT-TYPE
    SYNTAX      Counter64
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The BR MUST perform a validation of the consistency of
        the source IPv6 address and source port number for the
        packet using BMR."
    ::= { mapSecurityCheckEntry 2 }

mapSecurityCheckStatus 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."
    ::= { mapSecurityCheckEntry 3 }

mapSecurityCheckStorageType OBJECT-TYPE
    SYNTAX      StorageType
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
```



```

    "The storage type of this row. If the row is
      permanent(4), no objects in the row need be
      writable."
    ::= { mapSecurityCheckEntry 4 }

-- Conformance Information

mapMIBConformance OBJECT IDENTIFIER ::= {mapMIB 2}

mapMIBCompliances OBJECT IDENTIFIER ::= { mapMIBConformance 1 }

mapMIBGroups OBJECT IDENTIFIER ::= { mapMIBConformance 2 }

-- compliance statements

mapMIBCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        " Describes the minimal requirements for conformance
          to the MAP-E MIB."
    MODULE -- this module
        MANDATORY-GROUPS { mapMIBRuleGroup }
    ::= { mapMIBCompliances 1 }

-- Units of Conformance

mapMIBRuleGroup OBJECT-GROUP
    OBJECTS { mapRuleBAddress, mapMapRuleID,
              mapRuleIPv6Prefix,
              mapRuleIPv6PrefixLen,
              mapRuleIPv4Prefix,
              mapRuleIPv4PrefixLen,
              mapRuleStartPort,
              mapRuleEndPort mapRuleEALen,
              mapRuleStorageType }
    STATUS current
    DESCRIPTION
        " The collection of this objects are used to give the
          information of mapping rules in MAP-E."
    ::= { mapMIBGroups 1 }

END
```


6. IANA Considerations

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

Descriptor	OBJECT IDENTIFIER value
-----	-----
MAP-E-MIB	{ transmission XXX }

7. Security Considerations

The MAP-E MIB module can be used for configuration of certain objects, and anything that can be configured can be incorrectly configured, with potentially disastrous results. Because this MIB module reuses the IP tunnel MIB, the security considerations for these MIBs are also applicable to the MAP-E MIB.

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 principles (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

8. Acknowledgments

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9. References

9.1. Normative References

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9.2. Informative References

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10. Change Log [RFC Editor please remove]

[draft-fu-softwire-map-mib-00](#), original version, 2012-03-01
[draft-fu-softwire-map-mib-01](#), 01 version, 2012-07-16
[draft-fu-softwire-map-mib-03](#), deleted tunnel object according to the discussion in IETF85, 2013-02-04
[draft-fu-softwire-map-mib-04](#), added security check object according to discussion in IETF86

[draft-fu-softwire-map-mib-05](#), distinguishing FMR and BMR in mapRule object definition; added some description in [section 4](#); modifying a little bit to the mapRuleEntry definition

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