CLNS MIB
for use with
Connectionless Network Protocol (ISO 8473)
and
End System to Intermediate System (ISO 9542)

Status of this Memo

This memo defines an experimental portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. This is an Experimental Protocol for the Internet community. Discussion and suggestions for improvement are requested. Please refer to the current edition of the "IAB Official Protocol Standards" for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Table of Contents

1. The Network Management Framework....................... 1
2. Objects .................................................. 2
2.1 Format of Definitions ...................................... 2
3. Overview .................................................... 2
3.1 Textual Conventions ...................................... 3
3.2 Changes from RFC 1162 ..................................... 3
4. Definitions ................................................... 4
4.1 Textual Conventions ....................................... 4
4.2 Groups in the CLNS MIB ..................................... 4
4.3 The CLNP Group .......................................... 4
4.4 The CLNP Error Group ..................................... 21
4.5 The ES-IS Group .......................................... 30
5. References .................................................. 31
6. Security Considerations .................................... 32
7. Author’s Address............................................ 32

1. The Network Management Framework

The Internet-standard Network Management Framework consists of three components. They are:

RFC 1155 which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management. RFC 1212 defines a more concise description mechanism, which is wholly consistent with the SMI.

Satz
RFC 1238 which defines MIB-I, the core set of managed objects for the Internet suite of protocols. RFC 1213, defines MIB-II, an evolution of MIB-I based on implementation experience and new operational requirements.

RFC 1157 which defines the SNMP, the protocol used for network access to managed objects.

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

2. Objects

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) [7] defined in the SMI. In particular, each object has a name, a syntax, and an encoding. The name is an object identifier, an administratively assigned name, which specifies an object type. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the OBJECT DESCRIPTOR, to also refer to the object type.

The syntax of an object type defines the abstract data structure corresponding to that object type. The ASN.1 language is used for this purpose. However, the SMI [3] purposely restricts the ASN.1 constructs which may be used. These restrictions are explicitly made for simplicity.

The encoding of an object type is simply how that object type is represented using the object type’s syntax. Implicitly tied to the notion of an object type’s syntax and encoding is how the object type is represented when being transmitted on the network.

The SMI specifies the use of the basic encoding rules of ASN.1 [8], subject to the additional requirements imposed by the SNMP.

2.1. Format of Definitions

Section 4 contains the specification of all object types contained in this MIB module. The object types are defined using the conventions defined in the SMI, as amended by the extensions specified in [9].

3. Overview

The objects defined in this MIB module are be used when the ISO Connectionless-mode Network Protocol [10] and End System to
Intermediate System [11] protocols are present. No assumptions are made as to what underlying protocol is being used to carry the SNMP.

This memo uses the string encoding of [12] to textually describe OSI addresses.

3.1. Textual Conventions

A new data type is introduced as a textual convention in this MIB document. This textual conventions enhance the readability of the specification and can ease comparison with other specifications if appropriate. It should be noted that the introduction of this textual convention has no effect on either the syntax nor the semantics of any managed objects. The use of this is merely an artifact of the explanatory method used. Objects defined in terms of this methods are always encoded by means of the rules that define the primitive type. Hence, no changes to the SMI or the SNMP are necessary to accommodate this textual convention which are adopted merely for the convenience of readers and writers in pursuit of the elusive goal of clear, concise, and unambiguous MIB documents.

The ASN.1 type ClnpAddress is used to denote an OSI address. This consists of a string of octets. The first octet of the string contains a binary value in the range of 0..20, and indicates the the length in octets of the NSAP. Following the first octet, is the NSAP, expressed in concrete binary notation, starting with the most significant octet. A zero-length NSAP is used as a "special" address meaning "the default NSAP" (analogous to the IP address of 0.0.0.0). Such an NSAP is encoded as a single octet, containing the value 0. All other NSAPs are encoded in at least 4 octets.

3.2. Changes from RFC 1162

Features of this MIB include:

(1) The managed objects in this document have been defined using the conventions defined in the Internet-standard SMI, as amended by the extensions specified in [9]. It must be emphasized that definitions made using these extensions are semantically identically to those in RFC 1162.

(2) The PhysAddress textual convention from MIB-II has been introduced to represent media addresses.

(3) The clnpRoutingDiscards, clnpRouteMetric5, and clnpRouteInfo objects have been defined.
(4) The ClnpAddress type was mistakenly given a tag in RFC 1162. This error has been corrected.

4. Definitions

CLNS-MIB DEFINITIONS ::= BEGIN

IMPORTS
    experimental, Counter
    FROM RFC1155-SMI
    PhysAddress
    FROM RFC-1213
    OBJECT-TYPE
    FROM RFC-1212;

-- This MIB module uses the extended OBJECT-TYPE macro as
-- defined in [9]

-- the CLNS MIB module

clns OBJECT IDENTIFIER ::= { experimental 1 }

-- textual conventions

ClnpAddress ::= OCTET STRING (SIZE (1..21))
-- This data type is used to model NSAP addresses.

-- groups in the CLNS MIB

clnp OBJECT IDENTIFIER ::=  { clns 1 }
error OBJECT IDENTIFIER ::=  { clns 2 }
echo OBJECT IDENTIFIER ::=  { clns 3 }
es-is OBJECT IDENTIFIER ::=  { clns 4 }

-- the CLNP group

-- Implementation of this group is recommended for all
-- systems which implement the CLNP.
clnpForwarding OBJECT-TYPE
SYNTAX INTEGER {
    is(1), -- entity is an intermediate system
    es(2) -- entity is an end system and does not forward PDUs
}
ACCESS read-write
STATUS mandatory
DESCRIPTION
"The indication of whether this entity is active as an intermediate or end system. Only intermediate systems will forward PDUs onward that are not addressed to them."
::= { clnp 1 }

clnpDefaultLifeTime OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-write
STATUS mandatory
DESCRIPTION
"The default value inserted into the Lifetime field of the CLNP PDU header of PDUs sourced by this entity."
::= { clnp 2 }

clnpInReceives OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The total number of input PDUs received from all connected network interfaces running CLNP, including errors."
::= { clnp 3 }

clnpInHdrErrors OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of input PDUs discarded due to errors in the CLNP header, including bad checksums, version mismatch, lifetime exceeded, errors discovered in processing options, etc."
::= { clnp 4 }

Satz
clnpInAddrErrors OBJECT-TYPE
SYNTAX   Counter
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"The number of input PDUs discarded because the NSAP address in the CLNP header’s destination field was not a valid NSAP to be received at this entity. This count includes addresses not understood. For end systems, this is a count of PDUs which arrived with a destination NSAP which was not local."
 ::= { clnp 5 }

clnpForwPDUs OBJECT-TYPE
SYNTAX   Counter
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"The number of input PDUs for which this entity was not the final destination and which an attempt was made to forward them onward."
 ::= { clnp 6 }

clnpInUnknownNLPs OBJECT-TYPE
SYNTAX   Counter
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"The number of locally-addressed PDUs successfully received but discarded because the network layer protocol was unknown or unsupported (e.g., not CLNP or ES-IS)."
 ::= { clnp 7 }

clnpInUnknownULPs OBJECT-TYPE
SYNTAX   Counter
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"The number of locally-addressed PDUs successfully received but discarded because the upper layer protocol was unknown or unsupported (e.g., not TP4)."
 ::= { clnp 8 }

clnpInDiscards OBJECT-TYPE
SYNTAX   Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The number of input CLNP PDUs for which no
problems were encountered to prevent their
continued processing, but were discarded (e.g.,
for lack of buffer space). Note that this counter
does not include any PDUs discarded while awaiting
re-assembly."
::= { clnp 9 }

clnpInDelivers OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The total number of input PDUs successfully
delivered to the CLNS transport user."
::= { clnp 10 }

clnpOutRequests OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The total number of CLNP PDUs which local CLNS
user protocols supplied to CLNP for transmission
requests. This counter does not include any PDUs
counted in clnpForwPDUs."
::= { clnp 11 }

clnpOutDiscards OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The number of output CLNP PDUs for which no other
problem was encountered to prevent their
transmission but were discarded (e.g., for lack of
buffer space). Note this counter includes PDUs
counted in clnpForwPDUs."
::= { clnp 12 }

clnpOutNoRoutes OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The number of CLNP PDUs discarded because no route could be found to transmit them to their destination. This counter includes any PDUs counted in clnpForwPDUs."

::= { clnp 13 }

clnpReasmTimeout OBJECT-TYPE
SYNTAX  INTEGER
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The maximum number of seconds which received segments are held while they are awaiting reassembly at this entity."

::= { clnp 14 }

clnpReasmReqds OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The number of CLNP segments received which needed to be reassembled at this entity."

::= { clnp 15 }

clnpReasmOKs OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The number of CLNP PDUs successfully re-assembled at this entity."

::= { clnp 16 }

clnpReasmFails OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The number of failures detected by the CLNP reassembly algorithm (for any reason: timed out, buffer size, etc)."

::= { clnp 17 }

clnpSegOKs OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of CLNP PDUs that have been successfully segmented at this entity."
 ::= { clnp 18 }

clnpSegFails OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of CLNP PDUs that have been discarded because they needed to be fragmented at this entity but could not."
 ::= { clnp 19 }

clnpSegCreates OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of CLNP PDU segments that have been generated as a result of segmentation at this entity."
 ::= { clnp 20 }

clnpInOpts OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of CLNP PDU segments that have been input with options at this entity."
 ::= { clnp 25 }

clnpOutOpts OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of CLNP PDU segments that have been generated with options by this entity."
 ::= { clnp 26 }

clnpRoutingDiscards OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The number of routing entries which were chosen to be discarded even though they are valid. One possible reason for discarding such an entry could be to free-up buffer space for other routing entries."

::= { clnp 27 }

-- the CLNP Interfaces table

-- The CLNP interfaces table contains information on the entity’s interfaces which are running the CLNP.

clnpAddrTable OBJECT-TYPE
SYNTAX  SEQUENCE OF ClnpAddrEntry
ACCESS  not-accessible
STATUS  mandatory
DESCRIPTION
"The table of addressing information relevant to this entity’s CLNP addresses."
::= { clnp 21 }

clnpAddrEntry OBJECT-TYPE
SYNTAX  ClnpAddrEntry
ACCESS  not-accessible
STATUS  mandatory
DESCRIPTION
"The addressing information for one of this entity’s CLNP addresses."
INDEX  { clnpAdEntAddr }
::= { clnpAddrTable 1 }

ClnpAddrEntry ::=  
SEQUENCE  {
  clnpAdEntAddr
    ClnpAddress,
  clnpAdEntIfIndex
    INTEGER,
  clnpAdEntReasmMaxSize
    INTEGER (0..65535)
}

clnpAdEntAddr OBJECT-TYPE
SYNTAX  ClnpAddress
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The CLNP address to which this entry’s addressing
information pertains.
 ::= { clnpAddrEntry 1 }

clnpAdEntIfIndex OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-only
STATUS mandatory
DESCRIPTION "The index value which uniquely identifies the
interface to which this entry is applicable. The
interface identified by a particular value of this
index is the same interface as identified by the
same value of ifIndex."
 ::= { clnpAddrEntry 2 }

clnpAdEntReasmMaxSize OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-only
STATUS mandatory
DESCRIPTION "The size of the largest CLNP PDU which this
entity can re-assemble from incoming CLNP
segmented PDUs received on this interface."
 ::= { clnpAddrEntry 3 }

-- The CLNP Routing table
-- The CLNP routing table contains an entry for each route
-- known to the entity.

clnpRoutingTable OBJECT-TYPE
SYNTAX SEQUENCE OF ClnpRouteEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION "This entity’s CLNP routing table."
 ::= { clnp 22 }

clnpRouteEntry OBJECT-TYPE
SYNTAX ClnpRouteEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION "A route to a particular destination."
INDEX { clnpRouteDest }
 ::= { clnpRoutingTable 1 }
ClnpRouteEntry ::=  
SEQUENCE {  
  clnpRouteDest  
    ClnpAddress,  
  clnpRouteIfIndex  
    INTEGER,  
  clnpRouteMetric1  
    INTEGER,  
  clnpRouteMetric2  
    INTEGER,  
  clnpRouteMetric3  
    INTEGER,  
  clnpRouteMetric4  
    INTEGER,  
  clnpRouteNextHop  
    ClnpAddress,  
  clnpRouteType  
    INTEGER,  
  clnpRouteProto  
    INTEGER,  
  clnpRouteAge  
    INTEGER,  
  clnpRouteMetric5  
    INTEGER,  
  clnpRouteInfo  
    OBJECT IDENTIFIER  
}  

clnpRouteDest OBJECT-TYPE  
SYNTAX  ClnpAddress  
ACCESS  read-write  
STATUS  mandatory  
DESCRIPTION  
  "The destination CLNP address of this route."  
 ::=  {  clnpRouteEntry 1  }  

clnpRouteIfIndex OBJECT-TYPE  
SYNTAX  INTEGER  
ACCESS  read-write  
STATUS  mandatory  
DESCRIPTION  
  "The index value which uniquely identifies the local interface through which the next hop of this route should be reached. The interface identified by a particular value of this index is the same as identified by the same value of ifIndex."  
 ::=  {  clnpRouteEntry 2  }
clnpRouteMetric1 OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-write
STATUS mandatory
DESCRIPTION
"The primary routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route’s clnpRouteProto value. If this metric is not used, its value should be set to -1."
::= { clnpRouteEntry 3 }

clnpRouteMetric2 OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-write
STATUS mandatory
DESCRIPTION
"An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route’s clnpRouteProto value. If this metric is not used, its value should be set to -1."
::= { clnpRouteEntry 4 }

clnpRouteMetric3 OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-write
STATUS mandatory
DESCRIPTION
"An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route’s clnpRouteProto value. If this metric is not used, its value should be set to -1."
::= { clnpRouteEntry 5 }

clnpRouteMetric4 OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-write
STATUS mandatory
DESCRIPTION
"An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route’s clnpRouteProto value. If this metric is not used, its value should be set to -1."
::= { clnpRouteEntry 6 }
clnpRouteNextHop OBJECT-TYPE
SYNTAX  ClnpAddress
ACCESS  read-write
STATUS  mandatory
DESCRIPTION
"The CLNP address of the next hop of this route."
 ::= { clnpRouteEntry 7 }

clnpRouteType OBJECT-TYPE
SYNTAX  INTEGER {
  other(1),  -- none of the following
  invalid(2), -- an invalidated route
    -- route to directly
  direct(3),   -- connected (sub-)network
  remote(4)    -- route to a non-local
    -- host/network/sub-network
}
ACCESS  read-write
STATUS  mandatory
DESCRIPTION
"The type of route.

Setting this object to the value invalid(2) has
the effect of invaliding the corresponding entry
in the clnpRoutingTable. That is, it effectively
dissociates the destination identified with said
entry from the route identified with said entry.
It is an implementation-specific matter as to
whether the agent removes an invalidated entry
from the table. Accordingly, management stations
must be prepared to receive tabular information
from agents that corresponds to entries not
currently in use. Proper interpretation of such
entries requires examination of the relevant
clnpRouteType object."
 ::= { clnpRouteEntry 8 }

clnpRouteProto OBJECT-TYPE
SYNTAX  INTEGER {
  other(1),  -- none of the following
    -- non-protocol information
    -- e.g., manually
  local(2),   -- configured entries
-- set via a network
netmgmt(3), -- management protocol

-- similar to ipRouteProto but
-- omits several IP-specific
-- protocols

is-is(9),
ciscoIgrp(11),
bbnSpfIgp(12),
ospf(13),
bgp(14)
}
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The routing mechanism via which this route was learned. Inclusion of values for gateway routing protocols is not intended to imply that hosts should support those protocols."
::= { clnpRouteEntry 9 }

clnpRouteAge OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-write
STATUS mandatory
DESCRIPTION
"The number of seconds since this route was last updated or otherwise determined to be correct. Note that no semantics of ‘too old’ can be implied except through knowledge of the routing protocol by which the route was learned."
::= { clnpRouteEntry 10 }

clnpRouteMetric5 OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-write
STATUS mandatory
DESCRIPTION
"An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route’s clnpRouteProto value. If this metric is not used, its value should be set to -1."
::= { clnpRouteEntry 11 }

clnpRouteInfo OBJECT-TYPE
SYNTAX OBJECT IDENTIFIER
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"A reference to MIB definitions specific to the particular routing protocol which is responsible for this route, as determined by the value specified in the route’s clnpRouteProto value. If this information is not present, its value should be set to the OBJECT IDENTIFIER { 0 0 }, which is a syntactically valid object identifier, and any conformant implementation of ASN.1 and BER must be able to generate and recognize this value."
::= { clnpRouteEntry 12 }

-- the CLNP Address Translation table

-- The Address Translation tables contain the CLNP address to physical address equivalences. Some interfaces do not use translation tables for determining address equivalences; if all interfaces are of this type, then the Address Translation table is empty, i.e., has zero entries.

clnpNetToMediaTable OBJECT-TYPE
SYNTAX  SEQUENCE OF ClnpNetToMediaEntry
ACCESS  not-accessible
STATUS  mandatory
DESCRIPTION
"The CLNP Address Translation table used for mapping from CLNP addresses to physical addresses."
::= { clnp 23 }

clnpNetToMediaEntry OBJECT-TYPE
SYNTAX  ClnpNetToMediaEntry
ACCESS  not-accessible
STATUS  mandatory
DESCRIPTION
"Each entry contains one CLNP address to ‘physical’ address equivalence."
INDEX  { clnpNetToMediaIfIndex, clnpNetToMediaNetAddress }
::= { clnpNetToMediaTable 1 }

ClnpNetToMediaEntry ::= SEQUENCE {
  clnpNetToMediaIfIndex
  INTEGER,
clnpNetToMediaPhysAddress
   PhysAddress,
clnpNetToMediaNetAddress
   ClnpAddress,
clnpNetToMediaType
   INTEGER,
clnpNetToMediaAge
   INTEGER,
clnpNetToMediaHoldTime
   INTEGER
}

clnpNetToMediaIfIndex OBJECT-TYPE
   SYNTAX  INTEGER
   ACCESS  read-write
   STATUS  mandatory
   DESCRIPTION
      "The interface on which this entry’s equivalence
       is effective. The interface identified by a
       particular value of this index is the same
       interface as identified by the same value of
       ifIndex."
   ::= { clnpNetToMediaEntry 1 }

clnpNetToMediaPhysAddress OBJECT-TYPE
   SYNTAX  PhysAddress
   ACCESS  read-write
   STATUS  mandatory
   DESCRIPTION
      "The media-dependent ‘physical’ address."
   ::= { clnpNetToMediaEntry 2 }

clnpNetToMediaNetAddress OBJECT-TYPE
   SYNTAX  ClnpAddress
   ACCESS  read-write
   STATUS  mandatory
   DESCRIPTION
      "The CLNP address corresponding to the media-
       dependent ‘physical’ address."
   ::= { clnpNetToMediaEntry 3 }

clnpNetToMediaType OBJECT-TYPE
   SYNTAX  INTEGER { other(1),       -- none of the following
                     invalid(2),     -- an invalidated mapping
                     dynamic(3),     -- an invalidated mapping
                     static(4)       -- a static mapping
   }

Satz
The type of mapping.

Setting this object to the value invalid(2) has the effect of invalidating the corresponding entry in the clnpNetToMediaTable. That is, it effectively dissassociates the interface identified with said entry from the mapping identified with said entry. It is an implementation-specific matter as to whether the agent removes an invalidated entry from the table. Accordingly, management stations must be prepared to receive tabular information from agents that corresponds to entries not currently in use. Proper interpretation of such entries requires examination of the relevant clnpNetToMediaType object.

::= { clnpNetToMediaEntry 4 }

clnpNetToMediaAge OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-write
STATUS mandatory
DESCRIPTION
"The number of seconds since this entry was last updated or otherwise determined to be correct. Note that no semantics of ‘too old’ can be implied except through knowledge of the type of entry."

::= { clnpNetToMediaEntry 5 }

clnpNetToMediaHoldTime OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-write
STATUS mandatory
DESCRIPTION
"The time in seconds this entry will be valid. Static entries should always report this field as -1."

::= { clnpNetToMediaEntry 6 }

clnpMediaToNetTable OBJECT-TYPE
SYNTAX SEQUENCE OF ClnpMediaToNetEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The CLNP Address Translation table used for
mapping from physical addresses to CLNP addresses.

::= { clnp 24 }

clnpMediaToNetEntry OBJECT-TYPE
SYNTAX  ClnpMediaToNetEntry
ACCESS  not-accessible
STATUS  mandatory
DESCRIPTION
"Each entry contains on ClnpAddress to 'physical' address equivalence."
INDEX  { clnpMediaToNetIfIndex, clnpMediaToNetPhysAddress }
::= { clnpMediaToNetTable 1 }

ClnpMediaToNetEntry ::= SEQUENCE {
  clnpMediaToNetIfIndex
    INTEGER,
  clnpMediaToNetNetAddress
    ClnpAddress,
  clnpMediaToNetPhysAddress
    PhysAddress,
  clnpMediaToNetType
    INTEGER,
  clnpMediaToNetAge
    INTEGER,
  clnpMediaToNetHoldTime
    INTEGER
}

clnpMediaToNetIfIndex OBJECT-TYPE
SYNTAX  INTEGER
ACCESS  read-write
STATUS  mandatory
DESCRIPTION
"The interface on which this entry’s equivalence is effective. The interface identified by a particular value of this index is the same interface as identified by the same value of ifIndex."
::= { clnpMediaToNetEntry 1 }

clnpMediaToNetAddress OBJECT-TYPE
SYNTAX  ClnpAddress
ACCESS  read-write
STATUS  mandatory
DESCRIPTION
"The ClnpAddress corresponding to the media-
dependent 'physical' address.

::= { clnpMediaToNetEntry 2 }

clnpMediaToNetPhysAddress OBJECT-TYPE
SYNTAX  PhysAddress
ACCESS  read-write
STATUS  mandatory
DESCRIPTION
"The media-dependent 'physical' address."
::= { clnpMediaToNetEntry 3 }

clnpMediaToNetType OBJECT-TYPE
SYNTAX  INTEGER {
    other(1), -- none of the following
    invalid(2), -- an invalidated mapping
    dynamic(3),
    static(4)
}
ACCESS  read-write
STATUS  mandatory
DESCRIPTION
"The type of mapping.

Setting this object to the value invalid(2) has
the effect of invalidating the corresponding entry
in the clnpMediaToNetTable. That is, it
effectively dissassociates the interface
identified with said entry from the mapping
identified with said entry. It is an
implementation-specific matter as to whether the
agent removes an invalidated entry from the table.
Accordingly, management stations must be prepared
to receive tabular information from agents that
corresponds to entries not currently in use.
Proper interpretation of such entries requires
examination of the relevant clnpMediaToNetType
object."
::= { clnpMediaToNetEntry 4 }

clnpMediaToNetAge OBJECT-TYPE
SYNTAX  INTEGER
ACCESS  read-write
STATUS  mandatory
DESCRIPTION
"The number of seconds since this entry was last
updated or otherwise determined to be correct.
Note that no semantics of 'too old' can be implied
except through knowledge of the type of entry."
clnpMediaToNetHoldTime OBJECT-TYPE
SYNTAX  INTEGER
ACCESS  read-write
STATUS  mandatory
DESCRIPTION
"The time in seconds this entry will be valid.
Static entries should always report this field as
-1."
::= { clnpMediaToNetEntry 6 }

-- the CLNP Error group

-- Implementation of this group is recommended for all
-- systems which implement the CLNP Error protocol.

clnpInErrors OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The number of CLNP Error PDUs received by this
entity."
::= { error 1 }

clnpOutErrors OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The number of CLNP Error PDUs sent by this
entity."
::= { error 2 }

clnpInErrUnspecs OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
"The number of unspecified CLNP Error PDUs
received by this entity."
::= { error 3 }

clnpInErrProcs OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS mandatory
DESCRIPTION
"The number of protocol procedure CLNP Error PDUs received by this entity."
::= { error 4 }

clnpInErrCksums OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of checksum CLNP Error PDUs received by this entity."
::= { error 5 }

clnpInErrCongests OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of congestion drop CLNP Error PDUs received by this entity."
::= { error 6 }

clnpInErrHdrs OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of header syntax CLNP Error PDUs received by this entity."
::= { error 7 }

clnpInErrSegs OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of segmentation disallowed CLNP Error PDUs received by this entity."
::= { error 8 }

clnpInErrIncomps OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of incomplete PDU CLNP Error PDUs
clnpInErrDups OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of duplicate option CLNP Error PDUs received by this entity."
 ::= { error 9 }

clnpInErrUnreachDsts OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of unreachable destination CLNP Error PDUs received by this entity."
 ::= { error 10 }

clnpInErrUnknownDsts OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of unknown destination CLNP Error PDUs received by this entity."
 ::= { error 11 }

clnpInErrSRUnspecs OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of unspecified source route CLNP Error PDUs received by this entity."
 ::= { error 12 }

clnpInErrSRSyntaxes OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of source route syntax CLNP Error PDUs received by this entity."
 ::= { error 14 }
clnpInErrSRUnkAddrs OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of source route unknown address CLNP
   Error PDUs received by this entity."
 ::= { error 15 }

clnpInErrSRBadPaths OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of source route bad path CLNP Error
   PDUs received by this entity."
 ::= { error 16 }

clnpInErrHops OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of hop count exceeded CLNP Error PDUs
   received by this entity."
 ::= { error 17 }

clnpInErrHopReassms OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of hop count exceeded while
   reassembling CLNP Error PDUs received by this
   entity."
 ::= { error 18 }

clnpInErrUnsOptions OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of unsupported option CLNP Error PDUs
   received by this entity."
 ::= { error 19 }

clnpInErrUnsVersions OBJECT-TYPE
SYNTAX  Counter
access read-only
status mandatory
description "The number of version mismatch CLNP Error PDUs received by this entity."
::= { error 20 }

clnpInErrUnsSecurities OBJECT-TYPE
syntax Counter
access read-only
status mandatory
description "The number of unsupported security option CLNP Error PDUs received by this entity."
::= { error 21 }

clnpInErrUnsSRs OBJECT-TYPE
syntax Counter
access read-only
status mandatory
description "The number of unsupported source route option CLNP Error PDUs received by this entity."
::= { error 22 }

clnpInErrUnsRRs OBJECT-TYPE
syntax Counter
access read-only
status mandatory
description "The number of unsupported record route option CLNP Error PDUs received by this entity."
::= { error 23 }

clnpInErrInterferences OBJECT-TYPE
syntax Counter
access read-only
status mandatory
description "The number of reassembly interference CLNP Error PDUs received by this entity."
::= { error 24 }

clnpOutErrUnspecs OBJECT-TYPE
syntax Counter
access read-only
status mandatory
description
"The number of unspecified CLNP Error PDUs sent by this entity."
 ::= { error 25 }

clnpOutErrProcs OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
 "The number of protocol procedure CLNP Error PDUs sent by this entity."
 ::= { error 26 }

clnpOutErrCksums OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
 "The number of checksum CLNP Error PDUs sent by this entity."
 ::= { error 27 }

clnpOutErrCongests OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
 "The number of congestion drop CLNP Error PDUs sent by this entity."
 ::= { error 28 }

clnpOutErrHdrs OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
 "The number of header syntax CLNP Error PDUs sent by this entity."
 ::= { error 29 }

clnpOutErrSegs OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
 "The number of segmentation disallowed CLNP Error PDUs sent by this entity."
 ::= { error 30 }

clnpOutErrIncomps OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of incomplete PDU CLNP Error PDUs sent by this entity."
::= { error 31 }

clnpOutErrDups OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of duplicate option CLNP Error PDUs sent by this entity."
::= { error 32 }

clnpOutErrUnreachDsts OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of unreachable destination CLNP Error PDUs sent by this entity."
::= { error 33 }

clnpOutErrUnknownDsts OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of unknown destination CLNP Error PDUs sent by this entity."
::= { error 34 }

clnpOutErrSRUnspecs OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of unspecified source route CLNP Error PDUs sent by this entity."
::= { error 35 }

clnpOutErrSRSyntaxes OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS  mandatory
DESCRIPTION
   "The number of source route syntax CLNP Error PDUs
   sent by this entity."
 ::= { error 36 }

clnpOutErrSRUnkAddr OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of source route unknown address CLNP
   Error PDUs sent by this entity."
 ::= { error 37 }

clnpOutErrSRBadPaths OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of source route bad path CLNP Error
   PDUs sent by this entity."
 ::= { error 38 }

clnpOutErrHops OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of hop count exceeded CLNP Error PDUs
   sent by this entity."
 ::= { error 39 }

clnpOutErrHopReassms OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of hop count exceeded while
   reassembling CLNP Error PDUs sent by this entity."
 ::= { error 40 }

clnpOutErrUnsOptions OBJECT-TYPE
SYNTAX  Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of unsupported option CLNP Error PDUs
clnpOutErrUnsVersions OBJECT-TYPE
SYNTAX Count
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of version mismatch CLNP Error PDUs sent by this entity."
 ::= { error 41 }

clnpOutErrUnsSecurities OBJECT-TYPE
SYNTAX Count
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of unsupported security option CLNP Error PDUs sent by this entity."
 ::= { error 42 }

clnpOutErrUnsSRs OBJECT-TYPE
SYNTAX Count
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of unsupported source route option CLNP Error PDUs sent by this entity."
 ::= { error 43 }

clnpOutErrUnsRRs OBJECT-TYPE
SYNTAX Count
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of unsupported record route option CLNP Error PDUs sent by this entity."
 ::= { error 44 }

clnpOutErrInterferences OBJECT-TYPE
SYNTAX Count
ACCESS read-only
STATUS mandatory
DESCRIPTION
"The number of reassembly interference CLNP Error PDUs sent by this entity."
 ::= { error 46 }
-- the ES-IS group

-- Implementation of this group is recommended for all
-- systems which implement the End-System to Intermediate
-- System protocol.

esisEShIns OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION "The number of ESH PDUs received by this entity."
 ::= { es-is 1 }

esisEShOuts OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION "The number of ESH PDUs sent by this entity."
 ::= { es-is 2 }

esisIShIns OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION "The number of ISH PDUs received by this entity."
 ::= { es-is 3 }

esisIShOuts OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION "The number of ISH PDUs sent by this entity."
 ::= { es-is 4 }

esisRDUIns OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION "The number of RDU PDUs received by this entity."
 ::= { es-is 5 }

esisRDUOuts OBJECT-TYPE
SYNTAX Counter
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
   "The number of RDU PDUs sent by this entity."
   ::= { es-is 6 }
END

5. References

[1] Cerf, V., "IAB Recommendations for the Development of Internet

    Group", RFC 1109, NRI, August 1989.

    Management Information for TCP/IP-based Internets", RFC 1155,
    Performance Systems International and Hughes LAN Systems, May
    1990.

    Network Management of TCP/IP-based Internets", RFC 1156, Hughes

    Network Management Protocol", RFC 1157, University of Tennessee
    at Knoxville, Performance Systems International, Performance
    Systems International, and the MIT Laboratory for Computer

    Base for Network Management of TCP/IP-based Internets", RFC 1213,
    Hughes LAN Systems, Inc., Performance Systems International,

[7] Information processing systems - Open Systems Interconnection,
    "Specification of Abstract Syntax Notation One (ASN.1)",
    International Organization for Standardization, International

[8] Information processing systems - Open Systems Interconnection,
    "Specification of Basic Encoding Rules for Abstract Notation One
    (ASN.1)", International Organization for Standardization,

[9] Rose, M., and K. McCloghrie, Editors, "Concise MIB Definitions,
    RFC 1212, Performance Systems International, Hughes LAN Systems,
6. Security Considerations

Security issues are not discussed in this memo.

7. Author’s Address:

Greg Satz  
cisco Systems, Inc.  
1350 Willow Road  
Menlo Park, CA 94025  

Phone: (415) 326-1941  

Email: Satz@CISCO.COM