

Network Working Group
Request for Comments: 2457
Category: Standards Track

B. Clouston
Cisco Systems
B. Moore
IBM Corporation
November 1998

Definitions of Managed Objects for Extended Border Node

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Copyright Notice

Copyright (C) The Internet Society (1998). All Rights Reserved.

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 defines objects for monitoring and controlling network devices with APPN (Advanced Peer-to-Peer Network) EBN (Extended Border Node) capabilities. This memo identifies managed objects for the EBN architecture.

Table of Contents

1.0	Introduction	2
2.0	The SNMP Network Management Framework	2
3.0	Overview	3
3.1	EBN MIB Structure	4
3.1.1	enbDir group	5
3.1.2	ebnIsRscv group	5
3.1.3	ebnDirConfig group	7
3.1.4	ebnCos group	8
3.1.5	ebnSubnetRoutingList group	8
3.1.6	hbn group	8
4.0	Definitions	9
5.0	Security Considerations	24
6.0	Intellectual Property	25
7.0	Acknowledgments	25
8.0	References	25

9.0 Authors' Addresses	27
10.0 Full Copyright Statement	28

1.0 Introduction

This document is a product of the SNA NAU Services MIB Working Group. It defines a MIB module for managing devices with Advanced Peer-to-Peer Networking (APPN) Extended Border Node (EBN) capabilities.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119, reference [13].

2.0 The SNMP Network Management Framework

The SNMP Network Management Framework presently consists of six major components. They are:

- o the overall architecture, described in RFC 2271 [7].
- o the SMI, described in RFC 1902 [3], - the mechanisms used for describing and naming objects for the purpose of management.
- o the MIB-II, STD 17, RFC 1213 [2], - the core set of managed objects for the Internet suite of protocols.
- o the protocol, STD 15, RFC 1157 [1] and/or RFC 1905 [6] and/or RFC 2272 [8] -- the protocol for accessing managed information.
- o the user-based security model defined in RFC 2274 [10].
- o the view-based access control model defined in RFC 2275 [11].

Textual conventions are defined in RFC 1903 [4], and conformance statements are defined in RFC 1904 [5]. Common applications are defined in RFC 2273 [9].

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

This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translation.

3.0 Overview

This document identifies the proposed set of objects for monitoring the configuration and active characteristics of devices with EBN capabilities. The Extended Border Node function is an APPN enhancement for an APPN network node (NN). It supports topology isolation, subnet interconnection, and session establishment between subnets.

In a single APPN network, all network topology information is propagated to all network nodes. Directory searches can also be forwarded to all network nodes. As the network grows, this network traffic could become prohibitive. Also, in networks where different enterprises are connected via APPN, it may be desirable to shield an enterprise from the network traffic of another enterprise. EBNS allow customers to partition a network into subnets to reduce or shield such network traffic.

An EBN provides this function by blocking topology information exchange between subnets, and controlling where directory searches are forwarded. A subnetwork is a cluster of APPN NNs which share the same network topology. Subnetwork boundaries, or partitions, occur where an EBN and an NN adjacent to it have different network identifiers (NETIDs). They may also occur where an EBN and adjacent NN have the same NETID but are configured to have a subnetwork boundary.

The connection between two APPN nodes is an APPN transmission group (TG). A TG at a subnet boundary is called an Intersubnetwork Transmission Group (ISTG).

The subnet in which an EBN resides is called its native subnetwork. The subnet across the subnet boundary is called the non-native subnetwork, with respect to the EBN.

A cost of the EBN function is that customers may have difficulty determining the end-to-end route of sessions that cross subnet boundaries, and understanding how the EBN will control directory searches between subnets. This MIB addresses these issues.

Another challenge facing customers is to identify subnet boundaries formed by EBNS. The SNANAU APPN MIB [14] identifies subnet boundaries in the appnNnTopology group. The SNANAU APPN MIB provides management of APPN objects, and contains some tables that are extended by this MIB.

In this document, we describe EBN managed objects.

The EBN terms and overall architecture are available from the networking.raleigh.ibm.com ftp site [15].

Highlights of the management functions supported by the EBN MIB module include the following:

- o Identifying the subnet affiliation of LUs (logical units)
- o Identifying session routes in non-native subnets, with correlation to the route in the native subnet provided in the SNANAU APPN MIB.
- o Identifying the COS (Class of Service) mappings between subnets.
- o Identifying the subnet routing lists

This MIB module does not support:

- o Configuration of EBN nodes.
- o Historical information about session initiation failures.
- o Peripheral Border Node (PBN) support. PBN is an APPN function that only supports communication to adjacent subnetworks, and is not expected to be widely implemented.
- o Traps. The APPN MIB contains a trap for Alert conditions that may affect EBN resources. Although no APPN/EBN Alerts are defined today in the APPN MIB [14], they could exist in the future. The value for the affectedObject object contained in the alertTrap is determined by the implementation. It may contain a VariablePointer from the EBN MIB.

3.1 EBN MIB Structure

The EBN MIB module contains the following groups of objects:

- o ebnDir - subnet information about LUs.
- o ebnIsRscv - provides the RSCV (Route Selection Control Vector) and COS for the subnetwork on the BIND destination side of the EBN.
- o ebnDirConfig - objects related to the EBN directory.
- o ebnCos - COS mapping between subnetworks,

- o ebnSubnetRoutingList - the customer-supplied list of where to forward search requests.
- o hbn - HPR (High Performance Routing) EBN intermediate session information.

These groups are described below in more detail.

3.1.1 enbDir group

The ebnDir group contains the ebnDirTable, which is an extension to the appnDirTable. It specifies the subnet affiliation of LUs in the EBN's directory.

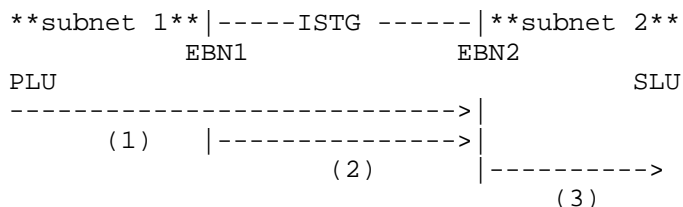
3.1.2 ebnIsRscv group

The ebnIsRscv group contains the ebnIsRscvTable, which is an extension to the appnIsInTable. The appnIsInTable only allows for the RSCV and COS name for one subnetwork traversed by a session. This extension contains the RSCV and COS name for the other subnetwork.

When an EBN changes RSCVs before forwarding a BIND, appnIsInRouteInfo contains the incoming RSCV, and ebnIsRscvDestinationRoute contains the outgoing RSCV.

The following three cases illustrate the contents of appnIsInRouteInfo and ebnIsRscvDestinationRoute at Extended Border Nodes.

1. EBN connected to another EBN

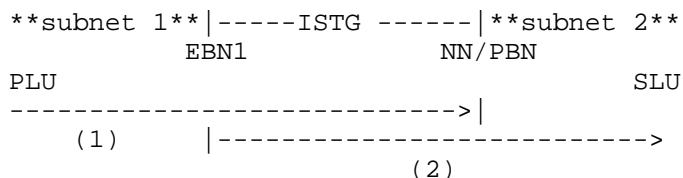


PLU = Primary Logical Unit (session initiator)
 SLU = Secondary Logical Unit (session destination)

The value of the appnIsInRouteInfo object at EBN1 is the RSCV containing the route, represented by (1), from the PLU (or the entry EBN in its subnet) to EBN2. The value of ebnIsRscvDestinationRoute object at EBN1 is the RSCV, represented by (2), containing the one-hop route from EBN1 to EBN2. The

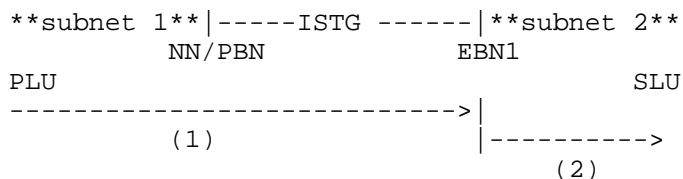
appnIsInRouteInfo object at EBN2 also contains the RSCV represented by (2). The value of ebnIsRscvDestinationRoute in EBN2 is the RSCV containing the route to the SLU (or to the next subnet's entry EBN), represented by (3).

2. EBN connected to a NN or PBN



The value of the appnIsInRouteInfo object at EBN1 is the RSCV containing the route from the PLU (or the entry EBN in its subnet) to the NN or PBN, represented by (1). The value of the ebnIsRscvDestinationRoute object at EBN1 is the RSCV containing the route from EBN1 to the SLU, represented by (2). Note that the SLU must be in subnet 2, because the entry node is an NN or PBN rather than an EBN. The appnIsInRouteInfo object at NN/PBN contains the same RSCV, as represented by (2).

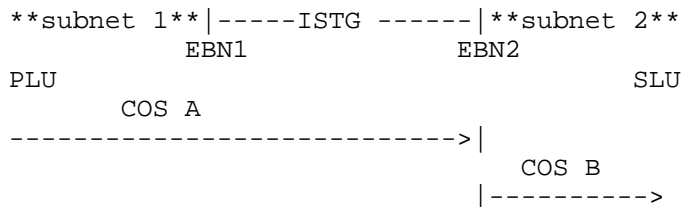
3. NN or PBN connected to EBN



The value of the appnIsInRouteInfo object at the NN/PBN is the RSCV containing the route from the PLU to EBN1, represented by (1). Note that the PLU must be in subnet 1, because the exit node is an NN/PBN rather than an EBN. The appnIsInRouteInfo object at EBN1 contains the same RSCV. The value of the ebnIsRscvDestinationRoute object at EBN1 is the RSCV containing the route from EBN1 to the SLU (or the next subnet's entry border node), as represented by (2).

The following three cases illustrate the contents of ebnIsRscvDestinationCos at Extended Border Nodes.

1. EBN connected to another EBN



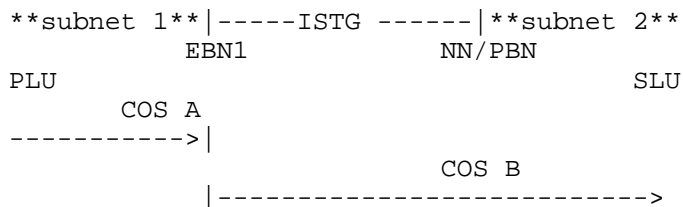
PLU = Primary Logical Unit (session initiator)

SLU = Secondary Logical Unit (session destination)

The value of ebnIsRscvDestinationCos object at EBN1 is COS A.

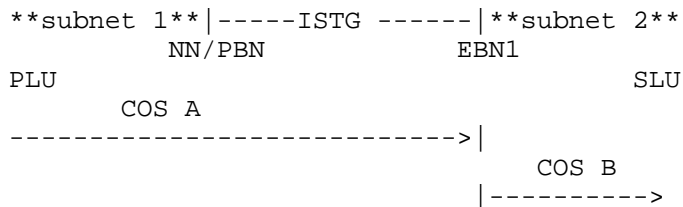
The value of ebnIsRscvDestinationCos object at EBN2 is COS B.

2. EBN connected to a NN or PBN



The value of the ebnIsRscvDestinationCos object at EBN1 is COS B.

3. NN or PBN connected to EBN



The value of the ebnIsRscvDestinationCos object at the EBN2 is COSB.

3.1.3 ebnDirConfig group

The ebnDirConfig group consists of simple objects that provide EBN-specific information about directory caching and the local default value for the maximum number of subnetworks a LOCATE search procedure may traverse.

3.1.4 ebnCos group

The ebnCos group contains the ebnCosMapTable, which specifies how COS values are mapped between the non-native subnetwork and the native subnetwork.

3.1.5 ebnSubnetRoutingList group

The ebnSubnetRoutingList group contains information about the customer-supplied EBN subnetwork routing list, which indicates to which adjacent nodes an EBN will forward LOCATE search requests. It consists of the following tables:

1. ebnSubnetSearchTable

This table has an entry for each LU name that has a defined subnet routing list. The LU name may identify a single LU, or it may contain a wildcard character that could identify a group of LUs (partial wildcard) or all LUs (full wildcard). The objects in the table indicate whether the EBN may add dynamic entries to the subnet routing list, and whether the subnet routing list entries may be reordered for better search performance.

2. ebnSearchTable

This table has an entry for each control point name which is included in a multi-subnet search for a particular LU name. The index to the table is the LU name to be searched for, and an index which lists the order in which the CP names are to be searched. Both the CP name and the LU name entries in the table allow for partial and full wildcards. The CP name also allows for special entries that indicate that the EBN will search itself and its own native subnetwork at this point in the search, or will search all native EBNs.

3.1.6 hbn group

The hbn group contains information about HBN (HPR EBN) intermediate sessions. The hbnIsInTable is an extension to the appnIsInTable. This table is present for intermediate sessions when there are back-to-back RTP (Rapid Transport Protocol) connections in an HBN. It provides the NCE ID (network connection endpoint identifier) and TCID (transport connection identifier) for the second RTP connection.

4.0 Definitions

```
EBN-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE, Unsigned32
        FROM SNMPv2-SMI
    MODULE-COMPLIANCE, OBJECT-GROUP
        FROM SNMPv2-CONF
    DisplayString, TEXTUAL-CONVENTION
        FROM SNMPv2-TC
    SnaControlPointName
        -- Because the characters allowed in an SNA control
        -- point name come from a restricted character set,
        -- these names are not subject to internationalization.
        FROM APPN-MIB
    snanauMIB
        FROM SNA-NAU-MIB;
```

```
ebnMIB    MODULE-IDENTITY
```

```
    LAST-UPDATED "9804281800Z" -- April 28, 1998
    ORGANIZATION "IETF SNA NAU MIB WG / AIW APPN MIBs SIG"
    CONTACT-INFO
```

```
"
```

```
    Bob Clouston
    Cisco Systems
    7025 Kit Creek Road
    P.O. Box 14987
    Research Triangle Park, NC 27709, USA
    Tel:      1 919 472 2333
    E-mail: clouston@cisco.com
```

```
    Bob Moore
    IBM Corporation
    BRQA/501
    P.O. Box 12195
    Research Triangle Park, NC 27709, USA
    Tel:      1 919 254 4436
    E-mail: remoore@us.ibm.com
```

```
"
```

```
DESCRIPTION
```

```
    " The MIB Module for Extended Border Node"
```

```
 ::= { snanauMIB 7 }
```

```
-- snanauMIB ::= { mib-2 34 }
```

```

-- *****
-- Textual Conventions
-----
SnaNAUWildcardName ::= TEXTUAL-CONVENTION
    STATUS current
    DESCRIPTION
        "Fully-qualified network NAU name. Entries take one of three
        forms:
        - Explicit entries do not contain the character '*'.
        - Partial Wildcard entries have the form 'ccc*', where
          'ccc' represents one to sixteen characters in a legal
          SNA NAU Name.
        - A full wildcard consists of a single character '*'."

    Because the characters allowed in an SNA NAU name come from
    a restricted character set, these names are not subject to
    internationalization."

SYNTAX DisplayString(SIZE(1..17))

-- *****
ebnObjects          OBJECT IDENTIFIER ::= { ebnMIB 1 }
-- *****

-- *****
-- EBN Directory Group
-- The ebnDirTable is an extension to the appnDirTable. It specifies
-- the subnet affiliation for LUs in the EBN's directory.
-- *****

ebnDir              OBJECT IDENTIFIER ::= { ebnObjects 1 }

ebnDirTable OBJECT-TYPE
    SYNTAX SEQUENCE OF EbnDirEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "The EBN Directory Table. This table is an extension
        to the APPN MIB's appnDirTable. Entries in this table
        are in one-to-one correspondence with entries in the
        appnDirTable, with corresponding entries having identical
        values for their respective indexes."

    ::= { ebnDir 1 }

ebnDirEntry OBJECT-TYPE
    SYNTAX EbnDirEntry
    MAX-ACCESS not-accessible

```

```

STATUS current
DESCRIPTION
    "Entry in the EBN Directory Table."

INDEX { ebnDirLuName }

 ::= { ebnDirTable 1 }

EbnDirEntry ::= SEQUENCE {
    ebnDirLuName          SnaNAUWildcardName,
    ebnDirSubnetAffiliation INTEGER }

ebnDirLuName OBJECT-TYPE
    SYNTAX SnaNAUWildcardName
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Fully qualified network LU name in the domain of a serving
        network node.  If this object has the same value as the
        appnDirLuName object in the APPN MIB, then the two objects
        are referring to the same LU."

    ::= { ebnDirEntry 1 }

ebnDirSubnetAffiliation OBJECT-TYPE
    SYNTAX INTEGER { native (1),
                    nonNative (2),
                    subarea (3) }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Specifies the subnetwork affiliation of the LU:
        - native(1)      : The LU is in the native APPN subnetwork.
        - nonNative(2)   : The LU is in a non-native APPN subnetwork.
        - subarea(3)     : The LU is in a subarea network."

    ::= { ebnDirEntry 2 }

-- *****
-- EBN Intermediate Session RSCV Group
-- This table is a sparse extension to the appnIsInTable.  For
-- sessions crossing ISTGs adjacent to the EBN, it contains the RSCV
-- and COS used in the direction of the BIND destination.
-- *****

ebnIsRscv          OBJECT IDENTIFIER ::= { ebnObjects 2 }

ebnIsRscvTable OBJECT-TYPE

```

SYNTAX SEQUENCE OF EbnIsRscvEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The EBN Intermediate Session RSCV table. This table is an extension to the appnIsInTable. It contains the RSCV and COS used in the direction of the BIND destination. There is an entry in this table for each session that traverses an ISTG when it enters or leaves this EBN, with corresponding entries having identical values for their respective indexes."

```
::= { ebnIsRscv 1 }
```

ebnIsRscvEntry OBJECT-TYPE

SYNTAX EbnIsRscvEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Entry in ebnIsRscvTable."

```
INDEX { ebnIsRscvCpName,
        ebnIsRscvPcid }
```

```
::= { ebnIsRscvTable 1 }
```

EbnIsRscvEntry ::= SEQUENCE {

```
    ebnIsRscvCpName          SnaControlPointName,
    ebnIsRscvPcid            OCTET STRING,
    ebnIsRscvDestinationRoute OCTET STRING,
    ebnIsRscvDestinationCos  DisplayString }
```

ebnIsRscvCpName OBJECT-TYPE

SYNTAX SnaControlPointName

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The network-qualified control point name of the node at which the session and PCID originated. For APPN and LEN nodes, this is either CP name of the APPN node at which the origin LU is located or the CP name of the NN serving the LEN node at which the origin LU is located. For DLUR resources it is the name of the owning SSCP."

If this object has the same value as the appnIsInFqCpName object in the APPN MIB, then the two objects are referring to the same APPN control point."

```
::= { ebnIsRscvEntry 1 }
```

ebnIsRscvPcid OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (8))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The procedure correlation identifier (PCID) of a session.
It is an 8-octet value.

If this object has the same value as the appnIsInPcid object in the APPN MIB, and if the corresponding ebnIsRscvCpName object has the same value as the corresponding appnIsInFqCpName object, then the entries indexed by these objects are referring to the same session."

::= { ebnIsRscvEntry 2 }

ebnIsRscvDestinationRoute OBJECT-TYPE

SYNTAX OCTET STRING(SIZE (0..255))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The route selection control vector (RSCV x'2B') used in the direction towards the SLU."

::= { ebnIsRscvEntry 3 }

ebnIsRscvDestinationCos OBJECT-TYPE

SYNTAX DisplayString (SIZE (1..8))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The Class of Service (COS) name used in the direction towards the SLU.

Because the characters allowed in an SNA COS name come from a restricted character set, these names are not subject to internationalization."

::= { ebnIsRscvEntry 4 }

```
-- *****
-- EBN Directory Config Group
-- The following simple objects provide information about EBN
-- directory.
-- *****
```

ebnDirConfig

OBJECT IDENTIFIER ::= { ebnObjects 3 }

```

ebnSearchCacheTime      OBJECT-TYPE
    SYNTAX Unsigned32
    UNITS "minutes"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The amount of time in minutes an extended border node will
        retain information about a multi-subnetwork search, once
        that search terminates.  A value 0 indicates that the
        EBN has no defined limit, and the number of entries is
        bounded only by memory."

 ::= { ebnDirConfig 1 }

ebnMaxSearchCache OBJECT-TYPE
    SYNTAX Unsigned32
    UNITS "entries"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The maximum number of multi-subnet entries to be cached.
        The value 0 indicates that the local node has no defined
        limit, and the number of entries is bounded only by
        memory."

 ::= { ebnDirConfig 2 }

ebnDefaultSubnetVisitCount  OBJECT-TYPE
    SYNTAX Unsigned32
    UNITS "topology subnetworks"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The default maximum number of subnetworks a LOCATE search
        procedure may traverse."

 ::= { ebnDirConfig 3 }

-- *****
-- EBN COS Mapping Group
-- The ebnCosMap Table specifies how non-native COS values are mapped
-- to COS values defined in the native subnetwork.  The COS mappings
-- that an EBN performs are determined by multiple factors, one of
-- which is a set of user-defined mappings.  This table returns the
-- COS mappings that the EBN is actually performing, rather than
-- the user-defined mappings.
-- *****

```

```

ebnCOS                                OBJECT IDENTIFIER ::= { ebnObjects 4 }

ebnCosMapTable OBJECT-TYPE
    SYNTAX SEQUENCE OF EbnCosMapEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "The EBN COS Mapping Table.  This table specifies how non-
        native COS values are mapped to COS values defined in the
        native subnetwork.

        Note:  The COS mappings that an EBN performs are determined
        by multiple factors, one of which is a set of user-defined
        initial mappings.  This table returns the COS mappings that
        the EBN is actually performing at the time it is queried,
        rather than the user-defined initial ones."

    ::= { ebnCOS 1 }

ebnCosMapEntry OBJECT-TYPE
    SYNTAX EbnCosMapEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "An entry in the EBN COS Mapping table."

    INDEX { ebnCosMapCpName,
            ebnCosMapNonNativeCos }

    ::= { ebnCosMapTable 1 }

EbnCosMapEntry ::= SEQUENCE {
    ebnCosMapCpName                SnaNAUWildcardName,
    ebnCosMapNonNativeCos          DisplayString,
    ebnCosMapNativeCos             DisplayString }

ebnCosMapCpName OBJECT-TYPE
    SYNTAX SnaNAUWildcardName
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Fully qualified network CP name for which the COS mapping
        applies."

    ::= { ebnCosMapEntry 1 }

ebnCosMapNonNativeCos OBJECT-TYPE
    SYNTAX DisplayString (SIZE(1..8))

```

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object contains one of the following values:

- An 8-character COS name used in a non-native subnetwork.
- The single character '*', identifying the entry with the default native COS for a non-native CP name. This entry is used when there is no entry in the table for a non-native CP name / non-native COS pair.

Because the characters allowed in an SNA COS name come from a restricted character set, these names are not subject to internationalization."

::= { ebnCosMapEntry 2 }

ebnCosMapNativeCos OBJECT-TYPE

SYNTAX DisplayString (SIZE(1..8))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"An 8-byte name for the class-of-service, as known in the native subnetwork.

Because the characters allowed in an SNA COS name come from a restricted character set, these names are not subject to internationalization."

::= { ebnCosMapEntry 3 }

```
-- *****
-- EBN Subnet Routing List Group
-- The EBN Subnet Routing List indicates to which nodes an EBN
-- forwards search request. This group contains information
-- pertaining to the CONFIGURED Subnet Routing List at an EBN. How a
-- particular search request is routed is determined by a transient
-- list that the EBN creates based on the configured list and other
-- factors.
-- *****
```

ebnSubnetRoutingList OBJECT IDENTIFIER ::= { ebnObjects 5 }

ebnSubnetSearchTable OBJECT-TYPE

SYNTAX SEQUENCE OF EbnSubnetSearchEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains one entry for each fully qualified LU name for which an associated subnet routing list has been defined. An entry in this table contains general characteristics of the subnet search routing list for an LU name. The routing list itself is represented by a set of contiguous entries in the ebnSearchTable."

```
::= { ebnSubnetRoutingList 1 }
```

ebnSubnetSearchEntry OBJECT-TYPE

SYNTAX EbnSubnetSearchEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry for the ebnSubnetSearchTable. The entry represents the configured parameters the EBN uses when it is determining how to search for the LU identified by the ebnSubnetSearchLuName object."

```
INDEX { ebnSubnetSearchLuName }
```

```
::= { ebnSubnetSearchTable 1 }
```

EbnSubnetSearchEntry ::= SEQUENCE {

```
    ebnSubnetSearchLuName      SnaNAUWildcardName,
    ebnSubnetSearchDynamics    INTEGER,
    ebnSubnetSearchOrdering    INTEGER }
```

ebnSubnetSearchLuName OBJECT-TYPE

SYNTAX SnaNAUWildcardName

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Fully qualified network LU name."

```
::= { ebnSubnetSearchEntry 1 }
```

ebnSubnetSearchDynamics OBJECT-TYPE

```
SYNTAX INTEGER { none(1),
                  limited(2),
                  full(3) }
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates whether an EBN may add dynamic entries to a subnetwork routing list. none(1) means no entries may be added to the subnetwork routing list. limited(2) means only likely entries may be added to the subnetwork routing

list. full(3) means all native extended border nodes and adjacent, non-native EBNs and NNs will be added to the subnetwork routing list."

::= { ebnSubnetSearchEntry 2 }

ebnSubnetSearchOrdering OBJECT-TYPE

SYNTAX INTEGER{ priority(1),
defined(2) }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates whether an EBN may reorder a subnetwork routing list so that entries which are more likely to be successful move to the top of the subnetwork routing list and entries which are more likely to be unsuccessful move to the bottom of the list.

The following values are defined:

- priority(1): Entries may be reordered.
- defined(2): Entries must not be reordered."

::= { ebnSubnetSearchEntry 3 }

-- Border node search table

ebnSearchTable OBJECT-TYPE

SYNTAX SEQUENCE OF EbnSearchEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table indicates the CONFIGURED list of control points to which the EBN sends Locate searches for a given fully qualified LU name. Each entry in the table indicates one control point that should be included in a multi-subnet search for a particular LU name."

::= { ebnSubnetRoutingList 2 }

ebnSearchEntry OBJECT-TYPE

SYNTAX EbnSearchEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the ebnSearchTable. An entry can exist in this table only if an entry exists in the ebnSubnetSearchTable with an ebnSubnetSearchLuName value matching this entry's ebnSearchLuName."

For a given ebnSearchLuName value, the ordering of entries provides by the ebnSearchIndex values corresponds to the order in which the control points to be searched appear in the CONFIGURED search list for the ebnSearchLuName."

```
INDEX { ebnSearchLuName,  
        ebnSearchIndex }
```

```
::= { ebnSearchTable 1 }
```

```
EbnSearchEntry ::= SEQUENCE {  
    ebnSearchLuName  SnaNAUWildcardName,  
    ebnSearchIndex   Unsigned32,  
    ebnSearchCpName  DisplayString,  
    ebnSearchSNVC    Unsigned32 }
```

ebnSearchLuName OBJECT-TYPE

SYNTAX SnaNAUWildcardName

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Fully qualified network LU name. If this object has the same value as the ebnSubnetSearchLuName object, then the two objects are referring to the same LU."

```
::= { ebnSearchEntry 1 }
```

ebnSearchIndex OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Secondary index enumerating the CONFIGURED order in which a search is forwarded to CPs for a particular LU name. The order for an actual search is determined dynamically by the EBN, based on this configured information and on other factors, including whether search dynamics and search ordering are enabled. Information on these last two settings is available in, respectively, the ebnSubnetSearchDynamics and ebnSubnetSearch ordering objects."

```
::= { ebnSearchEntry 2 }
```

ebnSearchCpName OBJECT-TYPE

SYNTAX DisplayString(SIZE(1..17))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object specifies the CP(s) to which a search should be forwarded. It either follows the SnaNAUWildcardName textual convention or takes one of the following special formats:

'*' indicates that all native EBNs and all adjacent non-native EBNs and NNs may be added to the routing list dynamically,

'*SELF' indicates that the EBN should search itself and its native subnetwork at this time during the cross-subnet search,

'*EBNS' indicates all native EBNs.

Because the characters allowed in a CP name come from a restricted character set, and because the three formats listed here use no special characters, this object is not subject to internationalization."

::= { ebnSearchEntry 3 }

ebnSearchSNVC OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The maximum number of subnets a Locate search procedure may traverse. "

::= { ebnSearchEntry 4 }

```
-- *****
-- HPR Extended Border Node Intermediate Session Group
-- The hbnIsInTable is a sparse extension to the appnIsInTable.
-- For sessions that use back-to-back RTP connections in an HBN,
-- this table provides the network connection endpoint identifier
-- (NceId) and the transport connection identifier (Tcid) for the
-- second RTP connection.
-- *****
```

hbn OBJECT IDENTIFIER ::= { ebnObjects 6 }

hbnIsInTable OBJECT-TYPE

SYNTAX SEQUENCE OF HbnIsInEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The HBN Intermediate Session table."

```
::= { hbn 1 }
```

hbnIsInEntry OBJECT-TYPE

SYNTAX HbnIsInEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Entry of the HBN Intermediate Session Table. An entry exists in this table for every intermediate session being routed between back-to-back RTP connections in the HBN.

When an entry for a session exists in this table, the NceIds and Tcids for the back-to-back RTP connections are made available in the following four objects:

RTP connection in the direction of the PLU:

- NceId: appnIsInRtpNceId (in the APPN MIB)
- Tcid: appnIsInRtpTcid (in the APPN MIB).

RTP connection in the direction of the SLU:

- NceId: hbnIsInRtpNceId (in this table)
- Tcid: hbnIsInRtpTcid (in this table)."

INDEX { hbnIsInFqCpName,
 hbnIsInPcid }

```
::= { hbnIsInTable 1 }
```

HbnIsInEntry ::= SEQUENCE {

hbnIsInFqCpName	SnaControlPointName,
hbnIsInPcid	OCTET STRING,
hbnIsInRtpNceId	OCTET STRING,
hbnIsInRtpTcid	OCTET STRING }

hbnIsInFqCpName OBJECT-TYPE

SYNTAX SnaControlPointName

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The network-qualified control point name of the node at which the session and PCID originated. For APPN and LEN nodes, this is either the CP name of the APPN node at which the origin LU is located or the CP name of the NN serving the LEN node at which the origin LU is located.

If this object has the same value as the appnIsInFqCpName object in the APPN MIB, then the two objects are referring to the same APPN control point."

```
::= { hbnIsInEntry 1 }
```

```
hbnIsInPcid OBJECT-TYPE
```

```
SYNTAX OCTET STRING (SIZE(8))
```

```
MAX-ACCESS not-accessible
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The procedure correlation identifier (PCID) of a session.
It is an 8-octet value.
```

```
If this object has the same value as the appnIsInPcid object
in the APPN MIB, and if the corresponding hbnIsInFqCpName
object has the same value as the corresponding
appnIsInFqCpName object, then the entries indexed by these
objects are referring to the same session."
```

```
::= { hbnIsInEntry 2 }
```

```
hbnIsInRtpNceId OBJECT-TYPE
```

```
SYNTAX OCTET STRING (SIZE(1..8))
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The HPR local Network Connection Endpoint of the session in
the direction of the SLU."
```

```
::= { hbnIsInEntry 3 }
```

```
hbnIsInRtpTcid OBJECT-TYPE
```

```
SYNTAX OCTET STRING (SIZE(8))
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The RTP connection local TCID of the session in the direction
of the SLU."
```

```
::= { hbnIsInEntry 4 }
```

```
-- *****
```

```
-- Conformance Statement
```

```
-- *****
```

```
ebnConformance OBJECT IDENTIFIER ::= { ebnMIB 2 }
```

```
ebnCompliances OBJECT IDENTIFIER ::= { ebnConformance 1 }
```

```
ebnGroups OBJECT IDENTIFIER ::= { ebnConformance 2 }
```

```
-- Compliance statements
```

```
ebnCompliance MODULE-COMPLIANCE
```

```
STATUS current
DESCRIPTION
    "The compliance statement for the SNMPv2 entities which
    implement the ebnMIB."

MODULE      -- this module

-- Unconditionally mandatory groups
MANDATORY-GROUPS {
    ebnDirectoryGroup,
    ebnIsRscvGroup,
    ebnDirectoryConfigGroup,
    ebnCosMappingGroup,
    ebnSubnetRoutingListGroup }

-- Conditionally mandatory groups
GROUP hbnIsInGroup
DESCRIPTION
    "The hbnIsInGroup is mandatory only for HPR extended border
    nodes."

 ::= { ebnCompliances 1 }

-- Group definitions
ebnDirectoryGroup OBJECT-GROUP
    OBJECTS { ebnDirSubnetAffiliation }
    STATUS current
    DESCRIPTION
        "The EBN-related directory objects."

 ::= { ebnGroups 1 }

ebnIsRscvGroup OBJECT-GROUP
    OBJECTS { ebnIsRscvDestinationRoute,
              ebnIsRscvDestinationCos }
    STATUS current
    DESCRIPTION
        "Two objects representing RSCV and class of service
        information saved by an EBN."

 ::= { ebnGroups 2 }

ebnDirectoryConfigGroup OBJECT-GROUP
    OBJECTS { ebnSearchCacheTime,
              ebnMaxSearchCache,
              ebnDefaultSubnetVisitCount }
    STATUS current
```

DESCRIPTION

"The EBN Directory Configuration Group."

::= { ebnGroups 3 }

ebnCosMappingGroup OBJECT-GROUP

OBJECTS { ebnCosMapNativeCos }

STATUS current

DESCRIPTION

"The EBN COS Mapping Group."

::= { ebnGroups 4 }

ebnSubnetRoutingListGroup OBJECT-GROUP

OBJECTS { ebnSubnetSearchDynamics,
 ebnSubnetSearchOrdering,
 ebnSearchCpName,
 ebnSearchSNVC }

STATUS current

DESCRIPTION

"The Subnet Routing List Group."

::= { ebnGroups 5 }

hbnIsInGroup OBJECT-GROUP

OBJECTS { hbnIsInRtpNceId, hbnIsInRtpTcid }

STATUS current

DESCRIPTION

"The HBN-related Intermediate Session Objects."

::= { ebnGroups 6 }

END

5.0 Security Considerations

Certain management information defined in this MIB may be considered sensitive in some network environments. Therefore, authentication of received SNMP requests and controlled access to management information SHOULD be employed in such environments. An authentication protocol is defined in [10]. A protocol for access control is defined in [11].

None of the read-only objects in the EBN MIB reports a password, user data, or anything else that is particularly sensitive. Some enterprises view their network configuration itself, as well as information about network usage and performance, as corporate assets;

such enterprises may wish to restrict SNMP access to most of the objects in the MIB.

There are no read-write objects in the EBN MIB.

6.0 Intellectual Property

The IETF takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on the IETF's procedures with respect to rights in standards-track and standards-related documentation can be found in BCP-11. Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF Secretariat.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights which may cover technology that may be required to practice this standard. Please address the information to the IETF Executive Director.

7.0 Acknowledgments

This MIB module is the product of the IETF SNA NAU MIB WG and the AIW APPN/HPR MIBs SIG. Thanks to Dave Billing, Cisco Systems; Katie Lee, IBM Corporation; and Marcia Peters, IBM Corporation, for their contributions and review.

8.0 References

- [1] Case, J., Fedor, M. Schoffstall, M. and J. Davin, "Simple Network Management Protocol", STD 15, RFC 1157, May 1990.
- [2] McCloghrie, K., and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets: MIB-II", STD 17, RFC 1213, March 1991.
- [3] Case, J., McCloghrie, K., Rose, M., and Waldbusser S., "Structure of Management Information for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1902, January 1996.

- [4] Case, J., McCloghrie, K., Rose, M., and Waldbusser, S., "Textual Conventions for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1903, January 1996.
- [5] Case, J., McCloghrie, K., Rose, M., and Waldbusser, S., "Conformance Statements for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1904, January 1996.
- [6] Case, J., McCloghrie, K., Rose, M., and Waldbusser, S., "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1905, January 1996.
- [7] Harrington D., Presuhn, R. and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", RFC 2271, January 1998.
- [8] Harrington D., Presuhn, R. and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", RFC 2272, January 1998.
- [9] Levi D., Meyer P. and B. Stewart, "SNMPv3 Applications", RFC 2273, January 1998.
- [10] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", RFC 2274, January 1998.
- [11] Wijnen, B., Presuhn, R. and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", RFC 2275, January 1998.
- [12] Hovey, R. and S. Bradner, "The Organizations Involved in the IETF Standards Process", BCP 11, RFC 2028, October 1996.
- [13] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [14] Clouston, B. and B. Moore, "Definition of Managed Objects for APPN", RFC 2455, November 1998.
- [15] IBM, APPN Extended Border Node Architecture Reference Version 1.0, available only via anonymous FTP at [networking.raleigh.ibm.com, as /pub/standards/aiw/appn/bordernode/ebn4.psbin](http://networking.raleigh.ibm.com/pub/standards/aiw/appn/bordernode/ebn4.psbin).
- [16] IBM, SNA/MS Formats, GC31-8302-01

9.0 Authors' Addresses

Bob Clouston
Cisco Systems
7025 Kit Creek Road
P.O. Box 14987
Research Triangle Park, NC 27709, USA

Phone: +1-919-472-2333
EMail: clouston@cisco.com

Robert Moore
Dept. BRQA/Bldg. 501/G114
IBM Corporation
P.O.Box 12195
3039 Cornwallis
Research Triangle Park, NC 27709, USA

Phone: +1-919-254-4436
EMail: remoore@us.ibm.com

10.0 Full Copyright Statement

Copyright (C) The Internet Society (1998). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

