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Definitions of Managed Objects for ATMARP dependent Server Cache Synchronization Protocol Using SMIv2

Status of this Memo

Abstract

This document defines the ATMARP[2], [3] protocol dependent part Management Information Base (MIB) for supporting Server Cache Synchronization Protocol (SCSP)[1]. SCSP is used to solve the generalized cache synchronization/cache-replication problem for distributed protocol entities. In a client/server paradigm, SCSP synchronizes caches (or a portion of the caches) of a set of server entities of a particular protocol which are bound to a Server Group.

The MIB module specified in this document follows the Structure of Management Information (SMI) for the Simple Network Management Protocol (SNMP) Version 2.

1. Introduction

This memo defines an experimental portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects for hosts or routers that use Server Cache Synchronization Protocol (SCSP) to synchronize caches among the distributed ATMARP servers in a server group. MIB objects are defined to enable management of the Local server (LS) and the cache synchronization/replication between LS and its associated Directly Connected Servers (DCS).

2. The SNMPV2 Network Management Framework

IETF RFC 1157 [5], RFC 1213 [6], and RFC 1902 [7] form the three major components of the SNMPv2 Network Management Framework.

- o RFC 1902 specifies the SMI, which is the mechanisms used for describing and naming objects for the purpose of management.
- o RFC 1213 defines the second version of the Management Information Base (MIB-II), which is the core set of managed objects for the TCP/IP based Internets.
- o RFC 1157 and/or RFC 1905 [8] specifies the protocol operations for SNMPV2, with respect to the to the sending and receiving of SNMP managed information.

In addition, RFC 1903 [9] defines Textual conventions for SNMPv2 and RFC 1904 [10] specifies the conformance statements for SNMPv2.

The SNMPv2 Framework allows new objects to be defined for the purpose of experimentation and evaluation.

2.1 Object Definition

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) defined in the SMI. In particular, each object type is named by an OBJECT IDENTIFIER, an administratively assigned name. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the descriptor, to refer to the object type.

3. Overview

SCSP contains three sub protocols: the "Hello" protocol, the "Cache Alignment" Protocol, and the "Cache State Update" protocol. The Hello protocol is used to monitor the status of the connections between the Local Server and its Directly Connected Servers. The "Cache Alignment" protocol is used to synchronize the cache of an initializing LS with the cache of its DCSs. The "Cache State Update" protocol is used to update the state of cache entries once the servers are synchronized.

Synchronization is performed on a per Server Group / Protocol basis. That is, a separate instance of the protocol is run for each SG in the box. Therefore, the SGID/PID pair uniquely identifies an instance of SCSP. Furthermore, A separate instance of the "Hello" and "Cache Alignment" protocol are maintained for each DCS of the Server Group. State machines exist to execute the protocol independently for each DCS session. For more information, refer to [1].

SCSP is used to synchronize distributed servers running a client/server protocol. Currently SCSP support for Classic IP (RFC2225)[11], MARS (RFC 2022)[12], and NHRP (RFC 2332)[13] has been defined in the protocol dependent part of SCSP [2], [3], [4].

This MIB provides specific information for management of SCSP when it applies to synchronize distributed ATMARP servers. This MIB MUST be used along with the protcol independent SCSP MIB. This ATMARP protocol dependent SCSP MIB carries management objects related to SCSP application to ATMARP, such as ATMARP server's IP address, server's ATM address, etc. The MIB is divided into server group table, local server table, peer server table, and HFSM table.

4. Definition of the SCSP ATMARP protocol dependent MIB

```
SCSPATMARP-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
    experimental, Integer32, IpAddress, Counter32
       FROM SNMPv2-SMI
    TEXTUAL-CONVENTION, RowStatus
       FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP
       FROM SNMPv2-CONF
    AtmAddr, AtmConnKind
       FROM ATM-TC-MIB
```

```
      scspServerGroupID, scspServerGroupPID, scspLSID, scspDCSID,
      ScspHFSMStateType, SCSPVPIInteger,SCSPVCIInteger
         FROM SCSP-MIB
      ;



   scspAtmarpMIB MODULE-IDENTITY
       LAST-UPDATED "9808020000Z" -- October 10, 1998
       ORGANIZATION "IETF Internetworking Over NBMA Working Group (ion)"
       CONTACT-INFO
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          Cliff X. Wang (cliff_wang@vnet.ibm.com)
          Colin Verrilli (verrilli@vnet.ibm.com)
          IBM Corp."

       DESCRIPTION
          "This module defines a portion of the management
           information base (MIB) for managing Server Cache
           Synchronizatio protocol applied to ATMARP servers."
       ::= { experimental 2002 }



    -- ***************************************************
    --   Top Level structure of the SCSP MIB
    -- ***************************************************

   scspAtmarpObjects        OBJECT IDENTIFIER ::= { scspAtmarpMIB 1}
   scspAtmarpNotifications  OBJECT IDENTIFIER ::= { scspAtmarpMIB 2}
   scspAtmarpConformance    OBJECT IDENTIFIER ::= { scspAtmarpMIB 3}


    -- ***************************************************
    --   SCSP MIB Objects
    -- ***************************************************


    -- ***************************************************
    --   SCSP atmarp Server Group Objects
    -- ***************************************************

   scspAtmarpServerGroupTable OBJECT-TYPE
       SYNTAX   SEQUENCE OF ScspAtmarpServerGroupEntry
       MAX-ACCESS  not-accessible
       STATUS   current
```

```
        DESCRIPTION
            "The objects defined in this table are used to for the
             management of SCSP server groups with application to
             IP over ATM operation (Classic IP). These objects SHOULD
             be used along with the protocol independent part objects
             to support the management of the SCSP protocol applied
             to synchronizing the atmarp servers in a LIS.

             There is one entry in this table for each server group.
             In the case of IP over ATM, each server group corresponds to
             a Logical IP Subnet."
        ::= { scspAtmarpObjects 1}


    scspAtmarpServerGroupEntry OBJECT-TYPE
        SYNTAX   ScspAtmarpServerGroupEntry
        MAX-ACCESS  not-accessible
        STATUS   current
        DESCRIPTION
            "Information about SCSP server group running IP over ATM
             operation. This table is indexed by scspServerGroupID and
             scspServerGroupPID. The two indeces point to a corresponding
             entry in the scspServerGroupTable."
        INDEX {scspServerGroupID, scspServerGroupPID}
        ::= { scspAtmarpServerGroupTable 1}


    ScspAtmarpServerGroupEntry ::=
        SEQUENCE {
          scspAtmarpServerGroupNetMask                IpAddress,
          scspAtmarpServerGroupSubnetAddr             IpAddress,
          scspAtmarpServerGroupRowStatus              RowStatus }


    scspAtmarpServerGroupNetMask  OBJECT-TYPE
        SYNTAX   IpAddress
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
           "The subnet mask associated with this Server Group."
        ::= { scspAtmarpServerGroupEntry 1 }


    scspAtmarpServerGroupSubnetAddr  OBJECT-TYPE
        SYNTAX   IpAddress
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
```

```
          "The IP subnet address associated with this Server Group."
       ::= { scspAtmarpServerGroupEntry 2 }


   scspAtmarpServerGroupRowStatus   OBJECT-TYPE
       SYNTAX   RowStatus
       MAX-ACCESS  read-create
       STATUS   current
       DESCRIPTION
          "This object allows Atmarp Server Group Table entries to be
           created and deleted from the scspAtmarpServerGroupTable. Note
           that scspAtmarpServerGroupTable entry creation and deletion
           is coupled with scspServerGroupTable entry creation and
           deletion. A scspAtmarpServerGroupTable entry cannot be
           created until its corresponding  scspServerGroupTable entry
           is created. When a scspServerGroupTable entry is deleted,
           it also removes the corresponding scspAtmarpServerGroupTable
           entry."
       REFERENCE
           "RFC 1903, 'Textual Conventions for version 2 of the Simple
            Network Management Protocol (SNMPv2).'"
       ::= { scspAtmarpServerGroupEntry 3 }



    -- ************************************************
    --   SCSP atmarp Local Server Objects
    -- ************************************************

   scspAtmarpLSTable OBJECT-TYPE
       SYNTAX   SEQUENCE OF ScspAtmarpLSEntry
       MAX-ACCESS  not-accessible
       STATUS   current
       DESCRIPTION
           "The objects defined in this table are used to for the
            management of the Atmarp Local server in a SCSP server group
            for IP over ATM operation. These objects SHOULD
            be used along with the protocol independent part objects
            to support the management of the SCSP protocol applied
            to synchronizing the IP over ATM servers."
       ::= { scspAtmarpObjects 2}


   scspAtmarpLSEntry OBJECT-TYPE
       SYNTAX   ScspAtmarpLSEntry
       MAX-ACCESS  not-accessible
       STATUS   current
       DESCRIPTION
```

```
          "Information about Atmarp Local Server in a SCSP server
           group. This table is indexed by scspServerGroupID,
           scspServerGroupPID, and scspLSID. The three indeces point
           to a corresponding entry in the scspLSTable."
       INDEX {scspServerGroupID,
              scspServerGroupPID,
              scspLSID
             }
       ::= { scspAtmarpLSTable 1}


   ScspAtmarpLSEntry ::=
       SEQUENCE {
           scspAtmarpLSLSIPAddr                IpAddress,
           scspAtmarpLSLSAtmAddr               AtmAddr,
           scspAtmarpLSRowStatus               RowStatus
       }



   scspAtmarpLSLSIPAddr  OBJECT-TYPE
       SYNTAX   IpAddress
       MAX-ACCESS  read-only
       STATUS   current
       DESCRIPTION
           "The IP address of the Atmarp Local Server. Since an Atmarp
            server does not have to be assigned an IP address, this
            object is optional."
       ::= { scspAtmarpLSEntry 1 }


   scspAtmarpLSLSAtmAddr OBJECT-TYPE
       SYNTAX   AtmAddr
       MAX-ACCESS  read-only
       STATUS   current
       DESCRIPTION
           "The ATM address of the Atmarp Local Server."
       ::= { scspAtmarpLSEntry 2 }


   scspAtmarpLSRowStatus   OBJECT-TYPE
       SYNTAX   RowStatus
       MAX-ACCESS  read-create
       STATUS   current
       DESCRIPTION
          "This object allows Atmarp Local Server Table entries to be
           created and deleted from the scspAtmarpLSTable. Note
           that scspAtmarpLSTable entry creation and deletion
```

```
            is coupled with scspLSTable entry creation and deletion.
            A scspAtmarpLSTable entry cannot be created until
            its corresponding scspLSTable entry is created.
            When a scspLSTable entry is deleted, it also removes
            the corresponding scspAtmarpLSTable entry."
        ::= { scspAtmarpLSEntry 3 }


    -- ************************************************
    --     SCSP Atmarp Peer Objects
    -- ************************************************

   scspAtmarpPeerTable OBJECT-TYPE
        SYNTAX   SEQUENCE OF ScspAtmarpPeerEntry
        MAX-ACCESS  not-accessible
        STATUS   current
        DESCRIPTION
            "The objects defined in this table are used to for the
             management of the ATMARP sever peers."
        ::= { scspAtmarpObjects 3}


   scspAtmarpPeerEntry OBJECT-TYPE
        SYNTAX   ScspAtmarpPeerEntry
        MAX-ACCESS  not-accessible
        STATUS   current
        DESCRIPTION
            "Information about each peer ATMARP server participated
             in the scsp Server group. The table is indexed by
             scspServerGroupID, scspServerGroupPID, and
             scspAtmarpPeerIndex."
        INDEX { scspServerGroupID,
                scspServerGroupPID,
                scspAtmarpPeerIndex
              }
        ::= { scspAtmarpPeerTable 1}


   ScspAtmarpPeerEntry ::=
        SEQUENCE {
            scspAtmarpPeerIndex              Integer32,
            scspAtmarpPeerIPAddr             IpAddress,
            scspAtmarpPeerAtmAddr            AtmAddr,
            scspAtmarpPeerVCType             AtmConnKind,
            scspAtmarpPeerVPI                SCSPVPIInteger,
            scspAtmarpPeerVCI                SCSPVCIInteger,
            scspAtmarpPeerDCSID              OCTET STRING(SIZE(0..63)),
            scspAtmarpPeerRowStatus          RowStatus
```

```
    }


  scspAtmarpPeerIndex  OBJECT-TYPE
      SYNTAX   Integer32
      MAX-ACCESS  read-only
      STATUS   current
      DESCRIPTION
           "The table index of the peer Atmarp server table."
      ::= { scspAtmarpPeerEntry 1 }


  scspAtmarpPeerIPAddr  OBJECT-TYPE
      SYNTAX   IpAddress
      MAX-ACCESS  read-only
      STATUS   current
      DESCRIPTION
           "The IP address of the peer Atmarp server. Since an Atmarp
            server does not have to be assigned an IP address,
            this object is optional."
      ::= { scspAtmarpPeerEntry 2 }

  scspAtmarpPeerAtmAddr OBJECT-TYPE
      SYNTAX   AtmAddr
      MAX-ACCESS  read-only
      STATUS   current
      DESCRIPTION
          "The ATM address of the Peer. If SVC is used between LS and
           Peer, Peer's ATM address should be valid. However, if PVC is
           used instead SVC, the Peer's ATM address may be a Null OCTET
           STRING."
      ::= { scspAtmarpPeerEntry 3 }


  scspAtmarpPeerVCType OBJECT-TYPE
      SYNTAX   AtmConnKind
      MAX-ACCESS  read-only
      STATUS   current
      DESCRIPTION
          "The type of the virtual circuit between LS and Peer."
      ::= { scspAtmarpPeerEntry 4 }


  scspAtmarpPeerVPI OBJECT-TYPE
```

```
        SYNTAX   SCSPVPIInteger
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
             "The VPI value for the virtual circuit between LS and Peer."
        ::= { scspAtmarpPeerEntry 5 }


    scspAtmarpPeerVCI OBJECT-TYPE
        SYNTAX   SCSPVCIInteger
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
            "The VCI value for the virtual circuit between LS and Peer."
        ::= { scspAtmarpPeerEntry 6 }


    scspAtmarpPeerDCSID OBJECT-TYPE
        SYNTAX   OCTET STRING(SIZE(0..63))
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
            "The DCS ID for this peer. When the peer tabel is created,
             DCS ID may not have been discovered. Tt is set to a
             Null string. It will be update when the DCS ID
             associated with this peer (ATM address) is discovered."
        ::= { scspAtmarpPeerEntry 7 }



    scspAtmarpPeerRowStatus   OBJECT-TYPE
        SYNTAX   RowStatus
        MAX-ACCESS  read-create
        STATUS   current
        DESCRIPTION
            "This object allows Atmarp Peer table entries to be created
             and deleted from the scspAtmarpPeerTable. Note that
             scspAtmarpPeerTable entry is created when a peer is
             configured loaclly or when a peer not previously
             configured connects to LS."
        REFERENCE
            "RFC 1903, 'Textual Conventions for version 2 of the Simple
             Network Management Protocol (SNMPv2).'"
        ::= { scspAtmarpPeerEntry 8 }
```

```
    -- ***************************************************
    --     SCSP atmarp HFSM Objects
    -- ***************************************************


   scspAtmarpHFSMTable OBJECT-TYPE
       SYNTAX   SEQUENCE OF ScspAtmarpHFSMEntry
       MAX-ACCESS  not-accessible
       STATUS   current
       DESCRIPTION
            "The objects defined in this table are used to for the
             management of the HFSM  between the LS and the DCS."
       ::= { scspAtmarpObjects 4}


   scspAtmarpHFSMEntry OBJECT-TYPE
       SYNTAX   ScspAtmarpHFSMEntry
       MAX-ACCESS  not-accessible
       STATUS   current
       DESCRIPTION
            "Information about SCSP HFSM session between the LS and
             its HFSMs. The table is indexed by
             scspServerGroupID, scspServerGroupPID, and
             scspAtmarpPeerIndex."
       INDEX { scspServerGroupID,
               scspServerGroupPID,
               scspAtmarpPeerIndex
             }
       ::= { scspAtmarpHFSMTable 1}


   ScspAtmarpHFSMEntry ::=
       SEQUENCE {
            scspHFSMHFSMState               ScspHFSMStateType,
            scspHFSMHelloIn                  Counter32,
            scspHFSMHelloOut                Counter32,
            scspHFSMHelloInvalidIn          Counter32,
            scspHFSMHelloInterval           Integer32,
            scspHFSMDeadFactor              Integer32,
            scspHFSMFamilyID                Integer32,
            scspAtmarpHFSMRowStatus         RowStatus
       }


   scspHFSMHFSMState  OBJECT-TYPE
       SYNTAX   ScspHFSMStateType
       MAX-ACCESS  read-only
       STATUS   current
```

```
        DESCRIPTION
             "The current state of the Hello Finite State Machine.
              The allowable states are:
                  down(1),
                  waiting(2),
                  uniConn(3),
                  biConn(4)."
        REFERENCE
             "SCSP draft, Section 2.1"
        ::= { scspAtmarpHFSMEntry 1 }


    scspHFSMHelloIn  OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
             "The number of 'Hello' messages received from this HFSM."
        ::= { scspAtmarpHFSMEntry 2 }


    scspHFSMHelloOut  OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
             "The number of 'Hello' messages sent from LS to this
              HFSM."
        ::= { scspAtmarpHFSMEntry 3 }

    scspHFSMHelloInvalidIn  OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
              "The number of invalid 'Hello' messages received from
               this HFSM. Possible message errors include:
               Hello message when the HFSM is in 'Down' state;
               Hello message is too short to contain the number of
               Receiver ID records specified in the header, etc.
               Other common errors include failed authentication if
               applicable, errors in the message fields, etc."
        ::= { scspAtmarpHFSMEntry 4 }


    scspHFSMHelloInterval  OBJECT-TYPE
        SYNTAX   Integer32 (0..65535)
        MAX-ACCESS  read-create
```

```
        STATUS   current
        DESCRIPTION
              "This object contains the value for HelloInterval with
               the associated HFSM. It is the time (in seconds)
               between sending of consecutive Hello messages from the
               HFSM."
        ::= { scspAtmarpHFSMEntry 5 }


    scspHFSMDeadFactor  OBJECT-TYPE
        SYNTAX   Integer32 (0..65535)
        MAX-ACCESS  read-create
        STATUS   current
        DESCRIPTION
             "This object contains the value for DeadFactor with
              this associated server. The DeadFactor along with
              HelloInterval are contained in 'Hello' messages sent
              from this HFSM. If 'Hello' messages are not received
              from this HFSM within the time out interval
              'HelloInterval*DeadFactor' (in seconds),
              then the HFSM MUST be considered  to be stalled."
        ::= { scspAtmarpHFSMEntry 6 }


    scspHFSMFamilyID  OBJECT-TYPE
        SYNTAX   Integer32 (0..65535)
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
             "The family ID is used to refer an aggregate of
              Protocol ID/SGID pairs. Only a single HFSM is
              run for all Protocol ID/SGID pairs assigned to
              a Family ID. When the HFSM is not shared by an
              aggregate of Protocol ID/SGID pairs, this
              object should be set to 0."
        REFERENCE
             "SCSP draft, Sec.2 and Sec. B.2.5"
        ::= { scspAtmarpHFSMEntry 7 }


    scspAtmarpHFSMRowStatus   OBJECT-TYPE
        SYNTAX   RowStatus
        MAX-ACCESS  read-create
        STATUS   current
        DESCRIPTION
            "This object allows Atmarp HFSM table entries to be created
             and deleted from the scspAtmarpHFSMTable. Note that
             scspAtmarpHFSMTable entry creation and deletion is
```

```
            closely coupled with scspHFSMTable entry creation.
            A scspAtmarpHFSMTable entry cannot be created until
            its corresponding scspHFSMTable entry is created.
            When a scspHFSMTable entry is deleted, it also removes
            the corresponding scspAtmarpHFSMTable entry."
        REFERENCE
            "RFC 1903, 'Textual Conventions for version 2 of the Simple
            Network Management Protocol (SNMPv2).'"
        ::= { scspAtmarpHFSMEntry 8 }


    -- ***********************************************************
    --       Notifications
    -- ***********************************************************

   scspHFSMDown NOTIFICATION-TYPE
        OBJECTS {
                 scspServerGroupID,
                 scspServerGroupPID,
                 scspAtmarpPeerIndex
                }
        STATUS  current
        DESCRIPTION
            "The Hello Finite State Machine associated with this
             LS/DCS pair enters 'Down' state."
        ::= { scspAtmarpNotifications 1 }

   scspHFSMWaiting NOTIFICATION-TYPE
        OBJECTS {
                 scspServerGroupID,
                 scspServerGroupPID,
                 scspAtmarpPeerIndex
          }
        STATUS  current
        DESCRIPTION
              "The Hello Finite State Machine associated with
               this LS/DCS pair enters 'Waiting' state."
        ::= { scspAtmarpNotifications 2 }


   scspHFSMBiConn NOTIFICATION-TYPE
        OBJECTS {
                   scspServerGroupID,
                   scspServerGroupPID,
                   scspAtmarpPeerIndex
        }
        STATUS  current
        DESCRIPTION
```

```
            "The Hello Finite State Machine associated with this
             LS/DCS pair enters 'Bidirectional connection' state."
        ::= { scspAtmarpNotifications 3 }


    -- ********************************************************
    -- Conformance Definitions
    -- ********************************************************

   scspAtmarpCompliances OBJECT IDENTIFIER ::={scspAtmarpConformance 1}
   scspAtmarpGroups      OBJECT IDENTIFIER ::={scspAtmarpConformance 2}


    --********************************************************
    --  SCSP MIB Compliance Statements
    --********************************************************


   scspAtmarpCompliance MODULE-COMPLIANCE
       STATUS  current
       DESCRIPTION
           "The compliance statement for entities that are required
            for the management of SCSP when applied to ATMARP servers."
       MODULE
            MANDATORY-GROUPS {
               scspAtmarpGroup
             }
       ::= { scspAtmarpCompliances 1 }



   scspAtmarpGroup OBJECT-GROUP
       OBJECTS {
            scspAtmarpServerGroupNetMask,
            scspAtmarpServerGroupSubnetAddr,
            scspAtmarpLSLSIPAddr,
            scspAtmarpLSLSAtmAddr,
            scspAtmarpPeerIndex,
            scspAtmarpPeerAtmAddr,
            scspAtmarpPeerVCType,
            scspAtmarpPeerVPI,
            scspAtmarpPeerVCI,
            scspAtmarpPeerDCSID,
            scspHFSMHFSMState,
            scspHFSMHelloIn,
            scspHFSMHelloOut,
            scspHFSMHelloInvalidIn,
            scspHFSMHelloInterval,
```

```
            scspHFSMDeadFactor,
            scspHFSMFamilyID
        }
       STATUS   current
       DESCRIPTION
            "This group is mandatory when Atmarp is the client/server
             protocol running SCSP."
       ::= { scspAtmarpGroups 1 }

   END
```

Acknowledgments

Reference

Authors' Addresses

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