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The Definitions of Managed Objects for the IP Network Control Protocol of the Point-to-Point Protocol

Status of this Memo

Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it describes managed objects used for managing the IP Network Control Protocol on subnetwork interfaces using the family of Point-to-Point Protocols [8, 9, 10, 11, & 12].

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1. The Network Management Framework

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

STD 16/RFC 1155 which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management. STD 16/RFC 1212 defines a more concise description mechanism, which is

wholly consistent with the SMI.

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

STD 15/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) [3] 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.

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 [5,6].

3. Overview

3.1. Object Selection Criteria

To be consistent with IAB directives and good engineering practice, an explicit attempt was made to keep this MIB as simple as possible. This was accomplished by applying the following criteria to objects proposed for inclusion:

(1) Require objects be essential for either fault or configuration management. In particular, objects for which the sole purpose was to debug implementations were explicitly excluded from the MIB.

(2) Consider evidence of current use and/or utility.

(3) Limit the total number of objects.

(4) Exclude objects which are simply derivable from others in

this or other MIBs.

3.2. Structure of the PPP

This section describes the basic model of PPP used in developing the PPP MIB. This information should be useful to the implementor in understanding some of the basic design decisions of the MIB.

The PPP is not one single protocol but a large family of protocols. Each of these is, in itself, a fairly complex protocol. The PPP protocols may be divided into three rough categories:

Control Protocols
: The Control Protocols are used to control the operation of the PPP. The Control Protocols include the Link Control Protocol (LCP), the Password Authentication Protocol (PAP), the Link Quality Report (LQR), and the Challenge Handshake Authentication Protocol (CHAP).

Network Protocols
: The Network Protocols are used to move the network traffic over the PPP interface. A Network Protocol encapsulates the datagrams of a specific higher-layer protocol that is using the PPP as a data link. Note that within the context of PPP, the term "Network Protocol" does not imply an OSI Layer-3 protocol; for instance, there is a Bridging network protocol.

Network Control Protocols (NCPs)
: The NCPs are used to control the operation of the Network Protocols. Generally, each Network Protocol has its own Network Control Protocol; thus, the IP Network Protocol has its IP Control Protocol, the Bridging Network Protocol has its Bridging Network Control Protocol and so on.

This document specifies the objects used in managing one of these protocols, namely the IP Network Control Protocol.

3.3. MIB Groups

Objects in this MIB are arranged into several MIB groups. Each group is organized as a set of related objects.

These groups are the basic unit of conformance: if the semantics of a group are applicable to an implementation then all objects in the group must be implemented.

The PPP MIB is organized into several MIB Groups, including, but not limited to, the following groups:

- The PPP Link Group
- The PPP LQR Group
- The PPP LQR Extensions Group
- The PPP IP Group
- The PPP Bridge Group
- The PPP Security Group

This document specifies the following group:

The PPP IP Group

The PPP IP Group contains configuration, status, and control variables that apply to the operation of IP over PPP.

Implementation of this group is mandatory for all implementations of PPP that support IP over PPP.

4. Definitions

```
PPP-IP-NCP-MIB DEFINITIONS ::= BEGIN

IMPORTS
     Counter
          FROM RFC1155-SMI
     ifIndex
          FROM RFC1213-MIB
     OBJECT-TYPE
          FROM RFC-1212
     ppp
          FROM PPP-LCP-MIB;

     -- The PPP IP Group.
     -- Implementation of this group is mandatory for all
     -- PPP implementations that support operating IP over PPP.

     pppIp OBJECT IDENTIFIER ::= { ppp 3 }


pppIpTable   OBJECT-TYPE
     SYNTAX    SEQUENCE OF PppIpEntry
     ACCESS    not-accessible
     STATUS    mandatory
     DESCRIPTION
               "Table containing the IP parameters and
               statistics for the local PPP entity."
     ::= { pppIp 1 }


pppIpEntry   OBJECT-TYPE
```

```
          SYNTAX    PppIpEntry
          ACCESS    not-accessible
          STATUS    mandatory
          DESCRIPTION
                    "IPCP status information for a particular PPP
                    link."
          INDEX     { ifIndex }
          ::= { pppIpTable 1 }


     PppIpEntry ::= SEQUENCE {
          pppIpOperStatus
               INTEGER,
          pppIpLocalToRemoteCompressionProtocol
               INTEGER,
          pppIpRemoteToLocalCompressionProtocol
               INTEGER,
          pppIpRemoteMaxSlotId
               INTEGER,
          pppIpLocalMaxSlotId
               INTEGER
     }

     -- The following object reflect the values of the option
     -- parameters used in the PPP IP Control Protocol
     --   pppIpLocalToRemoteCompressionProtocol
     --   pppIpRemoteToLocalCompressionProtocol
     --   pppIpRemoteMaxSlotId
     --   pppIpLocalMaxSlotId
     -- These values are not available until after the PPP Option
     -- negotiation has completed, which is indicated by the link
     -- reaching the open state (i.e., pppIpOperStatus is set to
     -- opened).
     --
     -- Therefore, when pppIpOperStatus is not opened
     -- the contents of these objects is undefined. The value
     -- returned when accessing the objects is an implementation
     -- dependent issue.


     pppIpOperStatus   OBJECT-TYPE
          SYNTAX    INTEGER {opened(1), not-opened(2)}
          ACCESS    read-only
          STATUS    mandatory
          DESCRIPTION
                    "The operational status of the IP network
                    protocol. If the value of this object is up
                    then the finite state machine for the IP
```

```
                network protocol has reached the Opened state."
        ::= { pppIpEntry 1 }


    pppIpLocalToRemoteCompressionProtocol   OBJECT-TYPE
        SYNTAX    INTEGER {
                  none(1),
                  vj-tcp(2)
              }
        ACCESS    read-only
        STATUS    mandatory
        DESCRIPTION
                  "The IP compression protocol that the local
                  PPP-IP entity uses when sending packets to the
                  remote PPP-IP entity. The value of this object
                  is meaningful only when the link has reached
                  the open state (pppIpOperStatus is opened)."
        ::= { pppIpEntry 2 }


    pppIpRemoteToLocalCompressionProtocol   OBJECT-TYPE
        SYNTAX    INTEGER {
                  none(1),
                  vj-tcp(2)
              }
        ACCESS    read-only
        STATUS    mandatory
        DESCRIPTION
                  "The IP compression protocol that the remote
                  PPP-IP entity uses when sending packets to the
                  local PPP-IP entity. The value of this object
                  is meaningful only when the link has reached
                  the open state (pppIpOperStatus is opened)."
        ::= { pppIpEntry 3 }


    pppIpRemoteMaxSlotId   OBJECT-TYPE
        SYNTAX    INTEGER(0..255)
        ACCESS    read-only
        STATUS    mandatory
        DESCRIPTION
                  "The Max-Slot-Id parameter that the remote node
                  has advertised and that is in use on the link.
                  If vj-tcp header compression is not in use on
                  the link then the value of this object shall be
                  0. The value of this object is meaningful only
                  when the link has reached the open state
                  (pppIpOperStatus is opened)."
```

```
          ::= { pppIpEntry 4 }


     pppIpLocalMaxSlotId   OBJECT-TYPE
          SYNTAX    INTEGER(0..255)
          ACCESS    read-only
          STATUS    mandatory
          DESCRIPTION
                    "The Max-Slot-Id parameter that the local node
                    has advertised and that is in use on the link.
                    If vj-tcp header compression is not in use on
                    the link then the value of this object shall be
                    0. The value of this object is meaningful only
                    when the link has reached the open state
                    (pppIpOperStatus is opened)."
          ::= { pppIpEntry 5 }


     --
     -- The PPP IP Configuration table.
     -- This is a separate table in order to facilitate
     -- placing these variables in a separate MIB view.
     --

     pppIpConfigTable   OBJECT-TYPE
          SYNTAX    SEQUENCE OF PppIpConfigEntry
          ACCESS    not-accessible
          STATUS    mandatory
          DESCRIPTION
                    "Table containing configuration variables for
                    the IPCP for the local PPP entity."
          ::= { pppIp 2 }


     pppIpConfigEntry   OBJECT-TYPE
          SYNTAX    PppIpConfigEntry
          ACCESS    not-accessible
          STATUS    mandatory
          DESCRIPTION
                    "IPCP information for a particular PPP link."
          INDEX     { ifIndex }
          ::= { pppIpConfigTable 1 }


     PppIpConfigEntry ::= SEQUENCE {
          pppIpConfigAdminStatus
               INTEGER,
          pppIpConfigCompression
```

```
                INTEGER
        }

        pppIpConfigAdminStatus   OBJECT-TYPE
             SYNTAX    INTEGER {open(1), close(2)}
             ACCESS    read-write
             STATUS    mandatory
             DESCRIPTION
                       "The immediate desired status of the IP network
                       protocol. Setting this object to open will
                       inject an administrative open event into the IP
                       network protocol's finite state machine.
                       Setting this object to close will inject an
                       administrative close event into the IP network
                       protocol's finite state machine."
             ::= { pppIpConfigEntry 1 }


        pppIpConfigCompression   OBJECT-TYPE
             SYNTAX    INTEGER {
                       none(1),
                       vj-tcp(2)
                  }
             ACCESS    read-write
             STATUS    mandatory
             DESCRIPTION
                       "If none(1) then the local node will not
                       attempt to negotiate any IP Compression option.
                       Otherwise, the local node will attempt to
                       negotiate compression mode indicated by the
                       enumerated value. Changing this object will
                       have effect when the link is next restarted."
             REFERENCE
                       "Section 4.0, Van Jacobson TCP/IP Header
                       Compression of RFC1332."
             DEFVAL    { none }
             ::= { pppIpConfigEntry 2 }


        END
```

5. Acknowledgements

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6. Security Considerations

The PPP MIB affords the network operator the ability to configure and control the PPP links of a particular system, including the PPP authentication protocols. This represents a security risk.

These risks are addressed in the following manners:

(1) All variables which represent a significant security risk are placed in separate, optional, MIB Groups. As the MIB Group is the quantum of implementation within a MIB, the implementor of the MIB may elect not to implement these groups.

(2) The implementor may choose to implement the variables which present a security risk so that they may not be written, i.e., the variables are READ-ONLY. This method still presents a security risk, and is not recommended, in that the variables, specifically the PPP Authentication Protocols' variables, may be easily read.

(3) Using SNMPv2, the operator can place the variables into MIB views which are protected in that the parties which have access to those MIB views use authentication and privacy protocols, or the operator may elect to make these views not accessible to any party. In order to facilitate this placement, all security-related variables are placed in separate MIB Tables. This eases the identification of the necessary MIB View Subtree.

7. References

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