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A. Bierman
C. Bucci
Cisco Systems, Inc.
R. Iddon
3Com, Inc.
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Remote Network Monitoring MIB Protocol Identifier Macros

Status of this Memo

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Abstract

This memo contains various protocol identifier examples, which can be used to produce valid protocolDirTable INDEX encodings, as defined by the Remote Network Monitoring MIB (Management Information Base) Version 2 [RFC2021] and the RMON Protocol Identifier Reference [RFC2895].

This document contains protocol identifier macros for well-known protocols. A conformant implementation of the RMON-2 MIB [RFC2021] can be accomplished without the use of these protocol identifiers, and accordingly, this document does not specify any IETF standard. It is published to encourage better interoperability between RMON-2 agent implementations, by providing a great deal of RMON related protocol information in one document.

The first version of the RMON Protocol Identifiers Document [RFC2074] has been split into a standards-track Reference portion [RFC2895], and an "RMON Protocol Identifier Macros", document (this document) which contains the non-normative portion of that specification.

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1. The SNMP Network Management Framework

The SNMP Management Framework presently consists of five major components:

- An overall architecture, described in RFC 2571 [RFC2571].

- Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIv1 and described in STD 16, RFC 1155 [RFC1155], STD 16, RFC 1212 [RFC1212] and RFC 1215 [RFC1215]. The second version, called SMIv2, is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

- Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, RFC 1157 [RFC1157]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in RFC 1901 [RFC1901] and RFC 1906 [RFC1906]. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [RFC1906], RFC 2572 [RFC2572] and RFC 2574 [RFC2574].

- Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, RFC 1157 [RFC1157]. A second set o protocol operations and associated PDU formats is described in RFC 1905 [RFC1905].

- A set of fundamental applications described in RFC 2573 [RFC2573] and the view-based access control mechanism described in RFC 2575 [RFC2575].

A more detailed introduction to the current SNMP Management Framework can be found in RFC 2570 [RFC2570].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo does not specify a MIB module.

2. Overview

The RMON-2 MIB [RFC2021] uses hierarchically formatted OCTET STRINGs to globally identify individual protocol encapsulations in the protocolDirTable.

This guide contains examples of protocol identifier encapsulations, which can be used to describe valid protocolDirTable entries. The syntax of the protocol identifier descriptor is defined in the RMON Protocol Identifier Reference [RFC2895].

This document is not intended to be an authoritative reference on the protocols described herein. Refer to the Official Internet Standards document [RFC2600], the Assigned Numbers document [RFC1700], or other appropriate RFCs, IEEE documents, etc. for complete and authoritative protocol information.

This is the the second revision of this document, and is intended to replace Section 5 of the first RMON-2 Protocol Identifiers document [RFC2074].

The RMONMIB working group has decided to discontinue maintenance of this Protocol Identifier Macro repository document, due to a lack of contributions from the RMON vendor community. This document is published as an aid in implementation of the protocolDirTable.

2.1. Terms

Refer to the RMON Protocol Identifier Reference [RFC2895] for definitions of terms used to describe the Protocol Identifier Macro and aspects of protocolDirTable INDEX encoding.

2.2. Relationship to the Remote Network Monitoring MIB

This document is intended to describe some protocol identifier macros, which can be converted to valid protocolDirTable INDEX values, using the mapping rules defined in the RMON Protocol Identifier Reference [RFC2895].

This document is not intended to limit the protocols that may be identified for counting in the RMON-2 MIB. Many protocol encapsulations, not explicitly identified in this document, may be present in an actual implementation of the protocolDirTable. Also, implementations of the protocolDirTable may not include all the protocols identified in the example section below.

2.3. Relationship to the RMON Protocol Identifier Reference

This document is intentionally separated from the normative reference document defining protocolDirTable INDEX encoding rules and the protocol identifier macro syntax [RFC2895]. This allows frequent updates to this document without any republication of MIB objects or protocolDirTable INDEX encoding rules. Note that the base layer and IANA assigned protocol identifier macros are located in Reference document, since these encoding values are defined by the RMONMIB WG.

Protocol Identifier macros submitted from the RMON working group and community at large (to the RMONMIB WG mailing list at ' rmonmib@cisco.com') will be collected and added to this document.

Macros submissions will be collected in the IANA's MIB files under the directory "ftp://ftp.isi.edu/mib/rmonmib/rmon2_pi_macros/" and in the RMONMIB working group mailing list message archive file "ftp://ftpeng.cisco.com/ftp/rmonmib/rmonmib".

2.4. Relationship to Other MIBs

The RMON Protocol Identifier Macros document is intended for use with the RMON Protocol Identifier Reference [RFC2895] and the RMON-2 MIB protocolDirTable [RFC2021]. It is not relevant to any other MIB, or intended for use with any other MIB.

3. Protocol Identifier Macros

This section contains protocol identifier macros for some well-known protocols, although some of them may no longer be in use. These macros reference the base layer identifiers found in section 4 of the RMON Protocol Identifier Reference [RFC2895]. These identifiers are listed below:

```
        ether2
        llc
        snap
        vsnap
        ianaAssigned
        802-1Q
```

Refer to the RMON Protocol Identifier Reference [RFC2895] for the protocol identifier macro definitions for these protocols.

3.1. Protocol Stacks And Single-Vendor Applications

Network layer protocol identifier macros contain additional information about the network layer, and is found immediately following a base layer-identifier in a protocol identifier.

The ProtocolDirParameters supported at the network layer are ’ countsFragments(0)’, and ’tracksSessions(1). An agent may choose to implement a subset of these parameters.

The protocol-name should be used for the ProtocolDirDescr field. The ProtocolDirType ATTRIBUTES used at the network layer are ’ hasChildren(0)’ and ’addressRecognitionCapable(1)’. Agents may choose to implement a subset of these attributes for each protocol, and therefore limit which tables the indicated protocol can be present (e.g. protocol distribution, host, and matrix tables).

The following protocol-identifier macro declarations are given for example purposes only. They are not intended to constitute an exhaustive list or an authoritative source for any of the protocol information given. However, any protocol that can encapsulate other protocols must be documented here in order to encode the children identifiers into protocolDirID strings. Leaf protocols should be documented as well, but an implementation can identify a leaf protocol even if it isn’t listed here (as long as the parent is documented).

3.1.1. The TCP/IP protocol stack

```
arp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "An Address Resolution Protocol message (request or response).
       This protocol does not include Reverse ARP (RARP) packets, which
       are counted separately."
    REFERENCE
       "RFC 826 [RFC826] defines the Address Resolution Protocol."
```

```
    ::= {
     ether2 0x806,   -- [ 0.0.8.6 ]
     snap   0x806,
     802-1Q 0x806    -- [ 0.0.8.6 ]
    }

ip PROTOCOL-IDENTIFIER
    PARAMETERS {
       countsFragments(0)  -- This parameter applies to all child
                           -- protocols.
    }
    ATTRIBUTES {
     hasChildren(0),
     addressRecognitionCapable(1)
    }
    DESCRIPTION
       "The protocol identifiers for the Internet Protocol (IP). Note
       that IP may be encapsulated within itself, so more than one of
       the following identifiers may be present in a particular
       protocolDirID string."
    CHILDREN
       "Children of 'ip' are selected by the value in the Protocol field
       (one octet), as defined in the PROTOCOL NUMBERS table within the
       Assigned Numbers Document.

       The value of the Protocol field is encoded in an octet string as
       [ 0.0.0.a ], where 'a' is the protocol field .

       Children of 'ip' are encoded as [ 0.0.0.a ], and named as 'ip a'
       where 'a' is the protocol field value.  For example, a
       protocolDirID-fragment value of:
          0.0.0.1.0.0.8.0.0.0.0.1

       defines an encapsulation of ICMP (ether2.ip.icmp)"
    ADDRESS-FORMAT
       "4 octets of the IP address, in network byte order.  Each ip
       packet contains two addresses, the source address and the
       destination address."
    DECODING
       "Note: ether2.ip.ipip4.udp is a different protocolDirID than
       ether2.ip.udp, as identified in the protocolDirTable.  As such,
       two different local protocol index values will be assigned by the
       agent. E.g. (full INDEX values shown):
        ether2.ip.ipip4.udp =
            16.0.0.0.1.0.0.8.0.0.0.0.4.0.0.0.17.4.0.0.0.0
        ether2.ip.udp =
            12.0.0.0.1.0.0.8.0.0.0.0.17.3.0.0.0 "
    REFERENCE
```

```
      "RFC 791 [RFC791] defines the Internet Protocol; The following
      URL defines the authoritative repository for the PROTOCOL NUMBERS
      Table:

         ftp://ftp.isi.edu/in-notes/iana/assignments/protocol-numbers"
   ::= {
      ether2     0x0800,
      llc        0x06,
      snap       0x0800,
         -- ip         4,          ** represented by the ipip4 macro
         -- ip         94,         ** represented by the ipip macro
      802-1Q     0x0800,         -- [0.0.8.0]
      802-1Q     0x02000006      -- 1Q-LLC [2.0.0.6]
   }

 -- ****************************************************************
 --
 --                        Children of IP
 --
 -- ****************************************************************

icmp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Internet Message Control Protocol"
    REFERENCE
       "RFC 792 [RFC792] defines the Internet Control Message Protocol."
    ::= {
     ip 1,
     ipip4 1,
     ipip 1
    }

igmp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Internet Group Management Protocol; IGMP is used by IP hosts to
       report their host group memberships to any immediately-
       neighboring multicast routers."
    REFERENCE
       "Appendix A of Host Extensions for IP Multicasting [RFC1112]
       defines the Internet Group Management Protocol."
    ::= {
     ip 2,
     ipip4 2,
     ipip 2
```

```
    }

ggp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Gateway-to-Gateway Protocol; DARPA Internet Gateway
       (historical)"
    REFERENCE
       "RFC 823 [RFC823] defines the Gateway-to-Gateway Protocol."
    ::= {
     ip 3,
     ipip4 3,
     ipip 3
    }

ipip4 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0),
     addressRecognitionCapable(1)
    }
    DESCRIPTION
       "IP in IP Tunneling"
    CHILDREN
       "Children of 'ipip4' are selected and encoded in the same manner
       as children of IP."
    ADDRESS-FORMAT
       "The 'ipip4' address format is the same as the IP address
       format."
    DECODING
       "Note: ether2.ip.ipip4.udp is a different protocolDirID than
       ether2.ip.udp, as identified in the protocolDirTable.  As such,
       two different local protocol index values will be assigned by the
       agent. E.g. (full INDEX values shown):
        ether2.ip.ipip4.udp =
            16.0.0.0.1.0.0.8.0.0.0.0.4.0.0.0.17.4.0.0.0.0
        ether2.ip.udp =
            12.0.0.0.1.0.0.8.0.0.0.0.17.3.0.0.0 "
    REFERENCE
       "RFC 1853 [RFC1853] defines IP in IP over Protocol 4."
    ::= {
     ip 4,
     ipip4 4,
     ipip 4
    }

st PROTOCOL-IDENTIFIER
```

```
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Internet Stream Protocol Version 2 (ST2); (historical) ST2 is an
       experimental resource reservation protocol intended to provide
       end-to-end real-time guarantees over an internet."
    REFERENCE
       "RFC 1819 [RFC1819] defines version 2 of the Internet Stream
       Protocol."
    ::= {
     ip 5,
     ipip4 5,
     ipip 5
    }

tcp  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
      hasChildren(0)
    }
    DESCRIPTION
       "Transmission Control Protocol"
    CHILDREN
       "Children of TCP are identified by the 16 bit Source or
       Destination Port value as specified in RFC 793. They are encoded
       as [ 0.0.a.b], where 'a' is the MSB and 'b' is the LSB of the
       port value. Both bytes are encoded in network byte order.  For
       example, a protocolDirId-fragment of:
           0.0.0.1.0.0.8.0.0.0.0.6.0.0.0.23

       identifies an encapsulation of the telnet protocol
       (ether2.ip.tcp.telnet)"
    REFERENCE
       "RFC 793 [RFC793] defines the Transmission Control Protocol.

       The following URL defines the authoritative repository for
       reserved and registered TCP port values:

         ftp://ftp.isi.edu/in-notes/iana/assignments/port-numbers"
    ::=  {
     ip 6,
     ipip4 6,
     ipip 6
    }

egp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
```

```
    DESCRIPTION
       "Exterior Gateway Protocol (historical)"
    REFERENCE
       "RFC 904 [RFC904] defines the Exterior Gateway Protocol."
    ::= {
     ip  8,
     ipip4  8,
     ipip  8
    }

igp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Any private interior gateway."
    REFERENCE
       "[RFC1700]"
    ::= {
     ip  9,
     ipip4  9,
     ipip  9
    }

nvp2 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "NVP-II; Network Voice Protocol"
    REFERENCE
       "RFC 741 [RFC741] defines the Network Voice Protocol"
    ::= {
     ip 11,
     ipip4 11,
     ipip 11
    }

pup PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "PUP Protocol"
    REFERENCE
       "Xerox"
    ::= {
     ip 12,
     ipip4 12,
     ipip 12
    }
```

```
xnet PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Cross Net Debugger (historical)"
    REFERENCE
       "[IEN158]"
    ::= {
     ip  15,
     ipip4  15,
     ipip  15
    }

chaos PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "CHAOS Protocol; historical"
    REFERENCE
       "J. Noel Chiappa  <JNC@XX.LCS.MIT.EDU>"
    ::= {
     ip 16,
     ipip4 16,
     ipip 16
    }

udp  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
      hasChildren(0)
    }
    DESCRIPTION
       "User Datagram Protocol"
    CHILDREN
       "Children of UDP are identified by the 16 bit Source or
       Destination Port value as specified in RFC 768. They are encoded
       as [ 0.0.a.b ], where 'a' is the MSB and 'b' is the LSB of the
       port value. Both bytes are encoded in network byte order.  For
       example, a protocolDirId-fragment of:
           0.0.0.1.0.0.8.0.0.0.0.17.0.0.0.161

       identifies an encapsulation of SNMP (ether2.ip.udp.snmp)"
    REFERENCE
       "RFC 768 [RFC768] defines the User Datagram Protocol.

       The following URL defines the authoritative repository for
       reserved and registered UDP port values:
```

```
          ftp://ftp.isi.edu/in-notes/iana/assignments/port-numbers"
    ::= {
     ip 17,
     ipip4 17,
     ipip 17
    }

mux PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Multiplexing Protocol (historical)"
    REFERENCE
       "IEN-90 [IEN-90] defines the Multiplexing Protocol"
    ::= {
     ip 18,
     ipip4 18,
     ipip 18
    }

hmp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Host Monitoring Protocol; historical"
    REFERENCE
       "RFC 869 [RFC869] defines the Host Monitoring Protocol"
    ::= {
     ip  20,
     ipip4  20,
     ipip  20
    }

xns-idp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "XEROX NS IDP"
    REFERENCE
       "Xerox Corporation"
    ::= {
     ip  22,
     ipip4  22,
     ipip  22
    }

rdp PROTOCOL-IDENTIFIER
    PARAMETERS { }
```

```
    ATTRIBUTES { }
    DESCRIPTION
       "Reliable Data Protocol"
    REFERENCE
       "RFC 908 [RFC908] defines the original protocol; RFC 1151
       [RFC1151] defines version 2 of the Reliable Data Protocol."
    ::= {
     ip 27,
     ipip4 27,
     ipip 27
    }

irtp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Internet Reliable Transaction Protocol"
    REFERENCE
       "RFC 938 [RFC938] defines the Internet Reliable Transaction
       Protocol functional and  interface specification."
    ::= {
     ip 28,
     ipip4 28,
     ipip 28
    }

iso-tp4  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "ISO Transport Protocol Specification"
    REFERENCE
       "RFC 905 [RFC905] defines the ISO Transport Protocol
       Specification; ISO DP 8073"
    ::= {
     ip  29,
     ipip4  29,
     ipip  29
    }

netblt PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Bulk Data Transfer Protocol; historical"
    REFERENCE
       "RFC 998 [RFC998] defines NETBLT: A Bulk Data Transfer Protocol."
    ::= {
```

```
     ip 30,
     ipip4 30,
     ipip 30
    }

mfe-nsp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "MFE Network Services Protocol; historical"
    REFERENCE
       "Shuttleworth, B., 'A Documentary of MFENet, a National Computer
       Network', UCRL-52317, Lawrence Livermore Labs, Livermore,
       California, June 1977."
    ::= {
     ip 31,
     ipip4 31,
     ipip 31
    }

idpr PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Inter-Domain Policy Routing Protocol"
    REFERENCE
       "RFC 1479 [RFC1479] defines Version 1 of the Inter-Domain Policy
       Routing Protocol."
    ::= {
     ip 35,
     ipip4 35,
     ipip 35
    }

idpr-cmtp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "IDPR Control Message Transport Protocol"
    REFERENCE
       "RFC 1479 [RFC1479] defines Version 1 of the Inter-Domain Policy
       Routing Protocol."
    ::= {
     ip 38,
     ipip4 38,
     ipip 38
    }
```

```
sdrp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Source Demand Routing Protocol"
    REFERENCE
       "RFC 1940 [RFC1940] defines version 1 of the Source Demand
       Routing: Packet Format and Forwarding Specification"
    ::= {
     ip 42,
     ipip4 42,
     ipip 42
    }

idrp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Inter-Domain Routing Protocol"
    REFERENCE
       "RFC 1745 [RFC1745] defines BGP4/IDRP for IP."
    ::= {
     ip 45,
     ipip4 45,
     ipip 45
    }

rsvp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Resource Reservation Setup Protocol"
    REFERENCE
       "Resource ReSerVation Protocol (RSVP); Version 1 Functional
        Specification [RFC2205]."
    ::= {
     ip 46,
     ipip4 46,
     ipip 46
    }

gre PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "General Routing Encapsulation"
    REFERENCE
        "RFC 1701 [RFC1701] defines Generic Routing Encapsulation (GRE);
```

```
       RFC 1702 [RFC1702] defines Generic Routing Encapsulation over
       IPv4 networks"
    ::= {
     ip 47,
     ipip4 47,
     ipip 47
    }

nhrp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "NBMA Next Hop Resolution Protocol (NHRP)"
    REFERENCE
       "RFC 2332 [RFC2332] defines the Next Hop Resolution Protocol."
    ::= {
     ip 54,
     ipip4 54,
     ipip 54
    }

priv-host PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol reserved for any internal host protocol."
    REFERENCE
       "[RFC1700]"
    ::= {
     ip 61,
     ipip4 61,
     ipip 61
    }

priv-net PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol reserved for any local network protocol."
    REFERENCE
       "[RFC1700]"
    ::= {
     ip 63,
     ipip4 63,
     ipip 63
    }

priv-distfile PROTOCOL-IDENTIFIER
```

```
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol reserved for any distributed file system."
    REFERENCE
       "[RFC1700]"
    ::= {
     ip 68,
     ipip4 68,
     ipip 68
    }

dgp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Dissimilar Gateway Protocol"
    REFERENCE
       "M/A-COM Government Systems, 'Dissimilar Gateway Protocol
       Specification, Draft Version', Contract no. CS901145, November
       16, 1987."
    ::= {
     ip 86,
     ipip4 86,
     ipip 86
    }

igrp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "IGRP; Cisco routing protocol"
    REFERENCE
       "Cisco Systems, Inc."
    ::= {
     ip 88,
     ipip4 88,
     ipip 88
    }

ospf PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Open Shortest Path First Interior GW Protocol (OSPFIGP)."
    REFERENCE
       "RFC 1583 [RFC1583] defines version 2 of the OSPF protocol."
    ::= {
```

```
     ip 89,
     ipip4 89,
     ipip 89
    }

mtp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Multicast Transport Protocol"
    REFERENCE
       "RFC 1301 [RFC1301] defines the Multicast Transport Protocol."
    ::= {
     ip 92,
     ipip4 92,
     ipip 92
    }

ax-25 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "AX.25 Frame Encapsulation"
    REFERENCE
       "RFC 1226 [RFC1226] defines Internet Protocol Encapsulation of
       AX.25 Frames."
    ::= {
     ip 93,
     ipip4 93,
     ipip 93
    }

ipip PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0),
     addressRecognitionCapable(1)
    }
    DESCRIPTION
       "IP-within-IP Encapsulation Protocol"
    CHILDREN
       "Children of 'ipip' are selected and encoded in the same manner
       as children of IP."
    ADDRESS-FORMAT
       "The 'ipip' address format is the same as the IP address format."
    DECODING
       "Note: ether2.ip.ipip.udp is a different protocolDirID than
       ether2.ip.udp, as identified in the protocolDirTable.  As such,
```

```
       two different local protocol index values will be assigned by the
       agent. E.g. (full INDEX values shown):
        ether2.ip.ipip.udp =
            16.0.0.0.1.0.0.8.0.0.0.0.94.0.0.0.17.4.0.0.0.0
        ether2.ip.udp =
            12.0.0.0.1.0.0.8.0.0.0.0.17.3.0.0.0 "
    REFERENCE
       "RFC 2003 [RFC2003] defines IP Encapsulation within IP."
    ::= {
     ip 94,
     ipip4 94,
     ipip 94
    }

encap PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Encapsulation Header; A Scheme for an Internet Encapsulation
       Protocol: Version 1"
    REFERENCE
       "RFC 1241 [RFC1241] defines version 1 of the ENCAP Protocol."
    ::= {
     ip 98,
     ipip4 98,
     ipip 98
    }

priv-encript PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol reserved for any private encryption scheme."
    REFERENCE
       "[RFC1700]"
    ::= {
     ip 99,
     ipip4 99,
     ipip 99
    }

 -- ****************************************************************
 --
 --                    Children of UDP and TCP
 --
 -- ****************************************************************

tcpmux  PROTOCOL-IDENTIFIER
```

```
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "TCP Port Service Multiplexer Port."
    REFERENCE
       "RFC 1078 [RFC1078] defines the TCP Port Service Multiplexer
       Protocol."
    ::= { tcp 1 }

rje  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Remote Job Entry Protocol; RJE Logger Port; (historical)."
    REFERENCE
       "RFC 407 [RFC407] defines the Remote Job Entry Protocol."
    ::= { tcp 5 }

echo  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Echo Protocol for debugging  TCP and UDP transports."
    REFERENCE
       "RFC 862 [RFC862] defines the Echo Protocol."
    ::= {
       tcp 7,
       udp 7  }

discard  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Discard Protocol for debugging TCP and UDP transports."
    REFERENCE
       "RFC 863 [RFC863] defines the Discard Protocol."
    ::= {
       tcp 9,
       udp 9  }

systat  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Retrieve the Active Users list; a debugging tool for TCP and UDP
       transports."
    REFERENCE
       "RFC 866 [RFC866] defines the Active Users Protocol."
```

```
    ::= {
       tcp 11,
       udp 11  }

daytime  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Retrieve the current time of day; a debugging tool for TCP and
       UDP transports."
    REFERENCE
       "RFC 867 [RFC867] defines the Daytime Protocol."
    ::= {
       tcp 13,
       udp 13  }

qotd  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Quote of the Day Protocol; retrieve a short message (up to 512
       bytes); a debugging tool for TCP and UDP transports."
    REFERENCE
       "RFC 865 [RFC865] defines the Quote of the Day Protocol."
    ::= {
       tcp 17,
       udp 17  }

msp  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Message Send Protocol"
    REFERENCE
       "RFC 1312 [RFC1312] defines the Message Send Protocol."

    ::= {
       tcp 18,
       udp 18  }

chargen  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Character Generator Protocol; a debugging tool for TCP and UDP
       transports."
    REFERENCE
       "RFC 864 [RFC864] defines the Character Generator Protocol."
```

```
    ::= {
       tcp 19,
       udp 19  }

ftp-data PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "The File Transfer Protocol Data Port; the FTP Server process
       default data-connection port. "
    REFERENCE
       "RFC 959 [RFC959] defines the File Transfer Protocol.  Refer to
       section 3.2 of [RFC959] for details on FTP data connections."
    ::= { tcp 20 }

ftp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "The File Transfer Protocol Control Port; An FTP client initiates
       an FTP control connection by sending FTP commands from user port
       (U) to this port."
    REFERENCE
       "RFC 959 [RFC959] defines the File Transfer Protocol."
    ::= { tcp 21 }

telnet PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "The Telnet Protocol; The purpose of the TELNET Protocol is to
       provide a fairly general, bi-directional, eight-bit byte oriented
       communications facility.  Its primary goal is to allow a standard
       method of interfacing terminal devices and terminal-oriented
       processes to each other. "
    REFERENCE
       "RFC 854 [RFC854] defines the basic Telnet Protocol."
    ::= { tcp 23 }

priv-mail PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol reserved for any private mail system."
    REFERENCE
       "[RFC1700]"
    ::= { tcp 24,
       udp 24 }
```

```
smtp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "The Simple Mail Transfer Protocol; SMTP control and data
       messages are sent on this port."
    REFERENCE
       "RFC 821 [RFC821] defines the basic Simple Mail Transfer
       Protocol."
    ::= { tcp 25 }

priv-print PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol reserved for any private printer server."
    REFERENCE
       "[RFC1700]"
    ::= { tcp 35,
       udp 35  }

time PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Time Protocol"
    REFERENCE
       "RFC 868 [RFC868] defines the Time Protocol."
    ::= { tcp 37,
       udp 37 }

rap PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Route Access Protocol"
    REFERENCE
       "RFC 1476 [RFC1476] defines the Internet Route Access Protocol."
    ::= { tcp 38 }

rlp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Resource Location Protocol"
    REFERENCE
       "RFC 887 [RFC887] defines the Resource Location Protocol."
    ::= { udp 39 }
```

```
graphics PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Graphics Protocol"
    REFERENCE
       "RFC 493 [RFC493] defines the Graphics Protocol."
    ::= { tcp 41,
       udp 41  }

nameserver  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Host Name Server Protocol"
    REFERENCE
       "IEN 116 [IEN116] defines the Internet Name Server."
    ::= { udp 42 }

nicname  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "NICNAME/WHOIS Protocol"
    REFERENCE
       "RFC 954 [RFC954] defines the NICNAME/Who Is Protocol."
    ::= { tcp 43 }

mpm-flags  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "MPM FLAGS Protocol; (historical)."
    REFERENCE
       "RFC 759 [RFC759] defines the Message Processing Module."
    ::= { tcp 44 }

mpm  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Message Processing Module -- Receiver; (historical)."
    REFERENCE
       "RFC 759 [RFC759] defines the Message Processing Module."
    ::= { tcp 45 }

mpm-snd  PROTOCOL-IDENTIFIER
    PARAMETERS { }
```

```
    ATTRIBUTES { }
    DESCRIPTION
       "Message Processing Module -- Default Send; (historical)."
    REFERENCE
       "RFC 759 [RFC759] defines the Message Processing Module."
    ::= { tcp 46 }

tacacs  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Login Host Protocol (TACACS)"
    REFERENCE
       "An Access Control Protocol, Sometimes Called TACACS [RFC1492]."
    ::= { tcp 49 }

re-mail-ck  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Remote Mail Checking Protocol"
    REFERENCE
       "RFC 1339 [RFC1339] defines the Remote Mail Checking Protocol."
    ::= { udp 50 }

xns-time  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "XNS Time Protocol"
    REFERENCE
       "Xerox Corporation"
    ::= { tcp 52,
       udp 52 }

domain PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Domain Name Service Protocol; DNS may be transported by either
       UDP [RFC768] or TCP [RFC793].  If the transport is UDP, DNS
       requests restricted to 512 bytes in length may be sent to this
       port."
    REFERENCE
       "RFC 1035 [RFC1035] defines the Bootstrap Protocol."
    ::= { udp 53,
       tcp 53  }
```

```
xns-ch PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "XNS Clearinghouse"
    REFERENCE
       "Xerox Corporation"
    ::= { tcp 54,
       udp 54 }

xns-auth PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "XNS Authentication Protocol"
    REFERENCE
       "Xerox Corporation"
    ::= { tcp 56,
       udp 56 }

priv-term PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol reserved for any private terminal access
       protocol."
    REFERENCE
       "[RFC1700]"
    ::= { tcp 57,
       udp 57 }

xns-mail PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "XNS Mil Protocol"
    REFERENCE
       "Xerox Corporation"
    ::= { tcp 58,
       udp 58 }

priv-file PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol reserved for any private file service."
    REFERENCE
       "[RFC1700]"
```

```
    ::= { tcp 59,
       udp 59 }

tacacs-ds PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Default Server Port; TACACS Access Control Protocol Database
       Service."
    REFERENCE
       "RFC 1492 [RFC1492] defines the TACACS Protocol."
    ::= { tcp 65 }

sqlnet PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Oracle SQL*NET"
    REFERENCE
       "Oracle Corporation"
    ::= { tcp 66 }

bootps PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Bootstrap Protocol Server Protocol; BOOTP Clients send requests
       (usually broadcast) to the bootps port."
    REFERENCE
       "RFC 951 [RFC951] defines the Bootstrap Protocol."
    ::= { udp 67 }

bootpc PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Bootstrap Protocol Client Protocol; BOOTP Server replies are
       sent to the BOOTP Client using this destination port."
    REFERENCE
       "RFC 951 [RFC951] defines the Bootstrap Protocol."
    ::= { udp 68 }

tftp PROTOCOL-IDENTIFIER
    PARAMETERS {
     tracksSessions(1)
    }
    ATTRIBUTES { }
    DESCRIPTION
```

```
       "Trivial File Transfer Protocol; Only the first packet of each
       TFTP transaction will be sent to port 69. If the tracksSessions
       attribute is set, then packets for each TFTP transaction will be
       attributed to tftp, instead of the unregistered port numbers that
       will be encoded in subsequent packets."
    REFERENCE
       "RFC 1350 [RFC1350] defines the TFTP Protocol (revision 2);
        RFC 1782 [RFC1782] defines TFTP Option Extensions;
        RFC 1783 [RFC1783] defines the TFTP Blocksize Option;
        RFC 1784 [RFC1784] defines TFTP Timeout Interval and Transfer
        Size  Options."
    ::= { udp 69 }

gopher PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Internet Gopher Protocol"
    REFERENCE
       "RFC 1436 [RFC1436] defines the Gopher Protocol."
    ::= { tcp 70 }

netrjs-1 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Remote Job Service Protocol; (historical)."
    REFERENCE
       "RFC 740 [RFC740] defines the NETRJS Protocol."
    ::= { tcp 71 }

netrjs-2 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Remote Job Service Protocol; (historical)."
    REFERENCE
       "RFC 740 [RFC740] defines the NETRJS Protocol."
    ::= { tcp 72 }

netrjs-3 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Remote Job Service Protocol; (historical)."
    REFERENCE
       "RFC 740 [RFC740] defines the NETRJS Protocol."
    ::= { tcp 73 }
```

```
netrjs-4 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Remote Job Service Protocol; (historical)."
    REFERENCE
       "RFC 740 [RFC740] defines the NETRJS Protocol."
    ::= { tcp 74 }

priv-dialout PROTOCOL-IDENTIFIER

    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol reserved for any private dial out service."
    REFERENCE
       "[RFC1700]"
    ::= { tcp 75,
       udp 75 }

priv-rje PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol reserved for any private remote job entry
       service."
    REFERENCE
       "[RFC1700]"
    ::= { tcp 77,
       udp 77 }

finger PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Finger User Information Protocol"
    REFERENCE
       "RFC 1288 [RFC1288] defines the finger protocol."
    ::= { tcp 79 }

www-http PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Hypertext Transfer Protocol"
    REFERENCE
       "RFC 1945 [RFC1945] defines the Hypertext Transfer Protocol
(HTTP/1.0).
```

```
        RFC 2068 [RFC2068] defines the Hypertext Transfer Protocol
(HTTP/1.1).
        RFC 2069 [RFC2069] defines an Extension to HTTP: Digest Access
           Authentication.
        RFC 2109 [RFC2109] defines the HTTP State Management Mechanism.
        RFC 2145 [RFC2145] defines the use and interpretation of HTTP
           version numbers."
    ::= { tcp 80 }

priv-termlink PROTOCOL-IDENTIFIER

    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol reserved for any private terminal link
       protocol."
    REFERENCE
       "[RFC1700]"
    ::= { tcp 87,
       udp 87 }

kerberos PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "The Kerberos Network Authentication Service (V5)"
    REFERENCE
       "RFC 1510 [RFC1510] defines the Kerberos protocol."
    ::= { udp 88 }

supdup PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "SUPDUP Display; (historical)"
    REFERENCE
       "RFC 734 [RFC734] defines the SUPDUP Protocol."
    ::= { tcp 95 }

dixie PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DIXIE Directory Service"
    REFERENCE
       "RFC 1249 [RFC1249] defines the DIXIE Protocol."
    ::= { tcp 96,
       udp 96 }
```

```
hostname  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "NIC Internet Hostname Server Protocol; (historical)"
    REFERENCE
       "RFC 953 [RFC953] defines the Hostname Server Protocol."
    ::= { tcp 101 }

3com-tsmux PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "3COM-TSMUX"
    REFERENCE
       "3Com, Inc."
    ::= { tcp 106,
       udp 106 }

rtelnet  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Remote User Telnet Protocol; (historical)."
    REFERENCE
       "RFC 818 [RFC818] defines the Remote User Telnet Service."
    ::= { tcp 107 }

pop2 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Post Office Protocol -- Version 2. Clients establish connections
       with POP2 servers by using this destination port number.
       Historical."
    REFERENCE
       "RFC 937 [RFC937] defines Version 2 of the Post Office Protocol."
    ::= { tcp 109 }

pop3 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Post Office Protocol -- Version 3. Clients establish connections
       with POP3 servers by using this destination port number."
    REFERENCE
       "RFC 1725 [RFC1725] defines Version 3 of the Post Office
       Protocol."
```

```
    ::= { tcp 110,
       udp 110 }     -- RFC defines tcp use

sunrpc PROTOCOL-IDENTIFIER

    PARAMETERS {
        tracksSessions(1) -- learn port mapping of programs
    }
    ATTRIBUTES {
        hasChildren(0)   -- port mapper function numbers
    }
    DESCRIPTION
       "SUN Remote Procedure Call Protocol. Port mapper function
       requests are sent to this destination port."
    CHILDREN
       "Specific RPC functions are represented as children of the sunrpc
       protocol.  Each 'RPC function protocol' is identified by its
       function number assignment. RPC function number assignments are
       defined by different naming authorities, depending on the
       function identifier value.
       From [RFC1831]:

       Program numbers are given out in groups of hexadecimal 20000000
       (decimal 536870912) according to the following chart:

                     0 - 1fffffff   defined by rpc@sun.com
              20000000 - 3fffffff   defined by user
              40000000 - 5fffffff   transient
              60000000 - 7fffffff   reserved
              80000000 - 9fffffff   reserved
              a0000000 - bfffffff   reserved
              c0000000 - dfffffff   reserved
              e0000000 - ffffffff   reserved

       Children of 'sunrpc' are encoded as [ 0.0.0.111], the protocol
       identifier component for 'sunrpc', followed by [ a.b.c.d ], where
       a.b.c.d is the 32 bit binary RPC program number encoded in
       network byte order.  For example, a protocolDirID-fragment value
       of:
           0.0.0.111.0.1.134.163

       defines the NFS function (and protocol).

       Children are named as 'sunrpc' followed by the RPC function
       number in base 10 format. For example, NFS would be named:
           'sunrpc 100003'."
    DECODING
       "The first packet of many SUNRPC transactions is sent to the
```

```
      port- mapper program, and therefore decoded statically by
      monitoring RFC portmap requests [RFC1831]. Any subsequent packets
      must be decoded and correctly identified by 'remembering' the
      port assignments used in each RPC function call (as identified
      according to the procedures in the RPC Specification Version 2
      [RFC1831]).

      In some cases the port mapping for a particular protocol is well
      known and hard coded into the requesting client.  In these cases
      the client will not send portmap requests; instead it will send
      the SUNRPC request directly to the well known port.  These cases
      are rare and are being eliminated over time.  NFS is the most
      significant SUNRPC program of this class.  Such programs should
      still be declared as children of SUNRPC as described under
      CHILDREN above.  How an implementation detects this behaviour and
      handles it is beyond the scope of this document.

      The 'tracksSessions(1)' PARAMETER bit is used to indicate whether
      the probe can (and should) monitor portmapper activity to
      correctly track SUNRPC connections."
   REFERENCE
      "RFC 1831 [RFC1831] defines the Remote Procedure Call Protocol
      Version 2.  The authoritative list of RPC Functions is identified
      by the URL:
          ftp://ftp.isi.edu/in-notes/iana/assignments/sun-rpc-numbers"
   ::= { tcp 111,
      udp 111 }

auth PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Authentication Service; Identification Protocol."
    REFERENCE
       "RFC 1413 [RFC1413] defines the Identification Protocol."
    ::= { tcp 113 }

sftp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Simple File Transfer Protocol; (historical)."
    REFERENCE
       "RFC 913 [RFC913] defines the Simple File Transfer Protocol."
    ::= { tcp 115 }

uucp-path  PROTOCOL-IDENTIFIER
```

```
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "UUCP Path Service"
    REFERENCE
       "RFC 915 [RFC915] defines the Network Mail Path Service."
    ::= { tcp 117 }

nntp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Network News Transfer Protocol"
    REFERENCE
       "RFC 977 [RFC977] defines the Network News Transfer Protocol."
    ::= { tcp 119 }

cfdptkt PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "CFDPTKT; Coherent File Distribution Protocol"
    REFERENCE
       "RFC 1235 [RFC1235] defines the Coherent File Distribution
       Protocol."
    ::= { udp 120 }

ntp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Network Time Protocol"
    REFERENCE
       "RFC 1305 [RFC1305] defines version 3 of the Network Time
       Protocol."
    ::= { udp 123 }

pwdgen  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Password Generator Protocol"
    REFERENCE
       "RFC 972 [RFC972] defines the Password Generator Protocol."
    ::= { tcp 129,
       udp 129  }

cisco-fna  PROTOCOL-IDENTIFIER
```

```
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "cisco FNATIVE"
    REFERENCE
       "Cisco Systems, Inc."
    ::= { tcp 130,
       udp 130 }

cisco-tna  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "cisco TNATIVE"
    REFERENCE
       "Cisco Systems, Inc."
    ::= { tcp 131,
       udp 131 }

cisco-sys  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "cisco SYSMAINT"
    REFERENCE
       "Cisco Systems, Inc."
    ::= { tcp 132,
       udp 132 }

statsrv  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Statistics Server; (historical)."
    REFERENCE
       "RFC 996 [RFC996] defines the Statistics Server Protocol."
    ::= { tcp 133,
       udp 133 }

 -- defined as nbt-name in IPX section
 -- netbios-ns      137/tcp    NETBIOS Name Service
 -- netbios-ns      137/udp    NETBIOS Name Service
 -- defined as nbt-data in IPX section
 -- netbios-dgm     138/tcp    NETBIOS Datagram Service
 -- netbios-dgm     138/udp    NETBIOS Datagram Service

 -- defined as nbt-session in IPX section
 -- netbios-ssn     139/tcp    NETBIOS Session Service
```

```
 -- netbios-ssn     139/udp    NETBIOS Session Service

imap2  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Interactive Mail Access Protocol v2;
        Internet Message Access Protocol v4 (IMAP4) also uses this
       server port."
    REFERENCE
       "RFC 1064 [RFC1064] defines Version 2 of the Interactive Mail
       Access
        Protocol.
        RFC 1730 [RFC1730] defines Version 4 of the Internet Message
       Access
        Protocol."
    ::= { tcp 143 }

iso-tp0  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "ISO-IP0; ISO-TP0 bridge between TCP and X.25"
    REFERENCE
       "RFC 1086 [RFC1086] defines the ISO-TP0 protocol."
    ::= { tcp 146,
       udp 146 }

iso-ip  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "ISO-IP; Use of the Internet as a Subnetwork for Experimentation
       with the OSI Network Layer"
    REFERENCE
       "RFC 1070 [RFC1070] defines the ISO-IP Protocol."
    ::= { tcp 147,
       udp 147 }

hems  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "HEMS; High Level Entity Management System; (historical)."
    REFERENCE
       "RFC 1021 [RFC1021] defines HEMS."
    ::= { tcp 151 }
```

```
bftp  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Background File Transfer Program"
    REFERENCE
       "RFC 1068 [RFC1068] defines the Background File Transfer
       Program."
    ::= { tcp 152 }

sgmp  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Simple Gateway Monitoring Protocol; (historical)."
    REFERENCE
       "RFC 1028 [RFC1028] defines the Simple Gateway Monitoring
       Protocol."
    ::= { udp 153 }

pcmail-srv  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "PCMail Server; Distributed Mail System Protocol (DMSP)"
    REFERENCE
       "RFC 1056 [RFC1056] defines the PCMAIL Protocol."
    ::= { tcp 158 }

sgmp-traps  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Simple Gateway Monitoring Protocol Traps; (historical)."
    REFERENCE
       "RFC 1028 [RFC1028] defines the Simple Gateway Monitoring

       Protocol."
    ::= { udp 160 }

 -- snmp and snmptrap found in the Protocol-Independent section
 -- snmp            161/udp    SNMP
 -- snmptrap        162/udp    SNMPTRAP

cmip-man  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
```

```
       "CMIP/TCP (CMOT) Manager; (historical)."
    REFERENCE
       "RFC 1095 [RFC1095] defines the Common Management Information
       Services and Protocol over TCP/IP."
    ::= { tcp 163,
       udp 163 }

cmip-agent  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "CMIP/TCP (CMOT) Agent; (historical)."
    REFERENCE
       "RFC 1095 [RFC1095] defines the Common Management Information
       Services and Protocol over TCP/IP."
    ::= { tcp 164,
       udp 164 }

xdmcp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "X Display Manager Control Protocol"
    REFERENCE
       "X11 Consortium"
    ::= { udp 177 }

bgp  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Border Gateway Protocol"
    REFERENCE
       "RFC 1267 [RFC1267] defines version 3 of the Border Gateway

       Protocol."
    ::= { tcp 179 }

remote-kis  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Remote-Knowbot Information Service (KIS)"
    REFERENCE
       "RFC 1739 [RFC1739] describes the KNOWBOT Protocol."
    ::= { tcp 185,
       udp 185 }
```

```
kis  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Knowbot Information Service (KIS)"
    REFERENCE
       "RFC 1739 [RFC1739] describes the KNOWBOT Protocol."
    ::= { tcp 186,
       udp 186 }

irc  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Internet Relay Chat Protocol"
    REFERENCE
       "RFC 1459 [RFC1459] defines the Internet Relay Chat Protocol."
    ::= { tcp 194,
       udp 194 }

smux PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "SMUX; SNMP MUX Protocol and MIB; (historical)."
    REFERENCE
       "RFC 1227 [RFC1227] defines the SMUX Protocol."
    ::= { tcp 199 }

 --
 -- AppleTalk applications are defined in the AppleTalk Stack section
 --
 -- at-rtmp         201/tcp    AppleTalk Routing Maintenance
 -- at-rtmp         201/udp    AppleTalk Routing Maintenance
 -- at-nbp          202/tcp    AppleTalk Name Binding
 -- at-nbp          202/udp    AppleTalk Name Binding
 -- at-3            203/tcp    AppleTalk Unused
 -- at-3            203/udp    AppleTalk Unused
 -- at-echo         204/tcp    AppleTalk Echo
 -- at-echo         204/udp    AppleTalk Echo
 -- at-5            205/tcp    AppleTalk Unused
 -- at-5            205/udp    AppleTalk Unused
 -- at-zis          206/tcp    AppleTalk Zone Information
 -- at-zis          206/udp    AppleTalk Zone Information
 -- at-7            207/tcp    AppleTalk Unused
 -- at-7            207/udp    AppleTalk Unused
 -- at-8            208/tcp    AppleTalk Unused
 -- at-8            208/udp    AppleTalk Unused
```

```
z39-50 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "ANSI Z39.50"
    REFERENCE
       "RFC 1729 [RFC1729] describes the Z39.50 Protocol."
    ::= { tcp 210 }

ipx-tunnel  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Tunneling IPX Traffic through IP Networks"
    REFERENCE
       "RFC 1234 [RFC1234] defines the IPX Tunnel Protocol."
    ::= { udp 213 }

mpp  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Netix Message Posting Protocol"
    REFERENCE
       "RFC 1204 [RFC1204] defines the Message Posting Protocol."
    ::= { tcp 218 }

imap3  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Interactive Mail Access Protocol v3; (historical)."
    REFERENCE
       "RFC 1203 [RFC1203] defines version 3 of the Interactive Mail
       Access Protocol."
    ::= { tcp 220 }

ldap  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Lightweight Directory Access Protocol"
    REFERENCE
       "RFC 1777 [RFC1777] defines Lightweight Directory Access
       Protocol; RFC 1798 [RFC1798] defines Connection-less Lightweight
       X.500 Directory Access Protocol"
    ::= { tcp 389,       -- RFC 1777
       udp 389  }        -- RFC 1798
```

```
mobileip-agent  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "IP Mobility Support"
    REFERENCE
       "RFC 2002 [RFC2002] defines the IP Mobility Support protocol."
    ::= { udp 434 }

https  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Secure HTTP; HTTP over TLS/SSL"
    REFERENCE
       "Netscape; http://home.netscape.com/eng/ssl3/"
    ::= { tcp 443 }

smtps  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "SMTP protocol over TLS/SSL"
    REFERENCE
       "Netscape; http://home.netscape.com/eng/ssl3/"
    ::= { tcp 465 }

isakmp  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Internet Security Association and Key Management Protocol
       (ISAKMP)"
    REFERENCE
       "RFC 2408 [RFC2408]"
    ::= { udp 500 }

login  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "BSD Rlogin; remote login a la telnet"
    REFERENCE
       "RFC 1282 [RFC1282] defines the BSD Rlogin Protocol."
    ::= { tcp 513 }

syslog  PROTOCOL-IDENTIFIER
    PARAMETERS { }
```

```
    ATTRIBUTES { }
    DESCRIPTION
       "syslog"
    REFERENCE
       "[RFC1700]"
    ::= { udp 514 }

uucp  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Unix-to-Unix copy protocol"
    REFERENCE
       "[RFC1700]"
    ::= { tcp 540 }

doom  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DOOM Game;"
    REFERENCE
       " Id Software"
    ::= { tcp 666 }

radius  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Remote Authentication Dial In User Service (RADIUS)"
    REFERENCE
       "RFC 2138 [RFC2138] defines the Radius protocol."
    ::= { udp 1812 }

radiusacct  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "RADIUS Accounting Protocol"
    REFERENCE
       "RFC 2139 [RFC2139] defines the Radius Accounting protocol."
    ::= { udp 1813 }

 --
 -- Portmapper Functions; Children of sunrpc
 --

portmapper PROTOCOL-IDENTIFIER
```

```
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "SUNRPC PORTMAPPER program.  This is the SUNRPC program which is
       used to locate the UDP/TCP ports on which other SUNRPC programs
       can be found."
    REFERENCE
       "Appendix A of RFC 1057 [RFC1057] describes the portmapper
       operation."
    ::= { sunrpc 100000 }

nfs  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Sun Network File System (NFS);"
    DECODING
       "NFS is a SUNRPC program which may or may not use the port mapper
       SUNRPC program to connect clients and servers.  In many cases the
       NFS server program runs over UDP/TCP port 2049, but an
       implementation is encouraged to perform further analysis before
       assuming that a packet to/from this port is a SUNRPC/NFS packet.
       Likewise an implementation is encouraged to track port mapper
       activity to spot cases where it is used to locate the SUNRPC/NFS
       program as this is more robust."
    REFERENCE
       "The NFS Version 3 Protocol Specification is defined in RFC 1813
       [RFC1813]."
    ::= {
     sunrpc 100003       --  [0.1.134.163]
    }

xwin PROTOCOL-IDENTIFIER
    PARAMETERS {
        tracksSessions(1)
    }
    ATTRIBUTES { }
    DESCRIPTION
       "X Windows Protocol"
    DECODING
       "The X Windows Protocol when run over UDP/TCP normally runs over
       the well known port 6000.  It can run over any port in the range
       6000 to 6063, however.  If the tracksSessions(1) parameter bit is
       set the agent can and should detect such X Window sessions and
       report them as the X protocol."
    REFERENCE
         "The X Windows Protocol is defined by TBD"
    ::= {
```

```
      tcp 6000,
      udp 6000
      -- lat ?
    }
```

3.1.2. Novell IPX Stack

```
ipx PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
      hasChildren(0),
      addressRecognitionCapable(1)
    }

    DESCRIPTION
       "Novell IPX"
    CHILDREN
       "Children of IPX are defined by the 8 bit packet type field.  The
       value is encoded into an octet string as [ 0.0.0.a ], where 'a'
       is the single octet of the packet type field.

       Notice that in many implementations of IPX usage of the packet
       type field is inconsistent with the specification and
       implementations are encouraged to use other techniques to map
       inconsistent values to the correct value (which in these cases is
       typically the Packet Exchange Protocol).  It is beyond the scope
       of this document to describe these techniques in more detail.

       Children of IPX are encoded as [ 0.0.0.a ], and named as 'ipx a'
       where a is the packet type value.  The novell echo protocol is
       referred to as 'ipx nov-echo' OR 'ipx 2'."
    ADDRESS-FORMAT
       "4 bytes of Network number followed by the 6 bytes Host address
       each in network byte order."
    REFERENCE
       "The IPX protocol is defined by the Novell Corporation

       A complete description of IPX may be secured at the following
       address:
              Novell, Inc.
              122 East 1700 South
              P. O. Box 5900
              Provo, Utah 84601 USA
              800 526 5463
              Novell Part # 883-000780-001"
    ::= {
        ether2       0x8137,       -- [0.0.129.55]
           snap         0x8137,       -- [0.0.129.55]
```

```
           ianaAssigned 1,            -- [0.0.0.1]   (ipxOverRaw8023)
        llc          224,          -- [0.0.0.224]
           802-1Q       0x8137,       -- [0.0.129.55]
        802-1Q       0x020000e0,   -- 1Q-LLC [2.0.0.224]
           802-1Q       0x05000001    -- 1Q-IANA [5.0.0.1]
                                      -- (ipxOverRaw8023)
    }

nov-rip PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Novell Routing Information Protocol"
    REFERENCE
       "Novell Corporation"
    ::= {
        ipx 0x01,       -- when reached by IPX packet type
        nov-pep 0x0453  -- when reached by IPX socket number
    }

nov-echo PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Novell Echo Protocol"
    REFERENCE
       "Novell Corporation"
    ::= { ipx 0x02 }

nov-error PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Novell Error-handler Protocol"
    REFERENCE
       "Novell Corporation"
    ::= { ipx 0x03 }

nov-pep PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
       "Novell Packet Exchange Protocol.  This is really a null protocol
       layer as all IPX packets contain the relevant fields for this
       protocol.  This protocol is defined so that socket-based decoding
       has a point of attachment in the decode tree while still allowing
```

```
      packet type based decoding also."
    CHILDREN
      "Children of PEP are defined by the 16 bit socket values.  The
      value is encoded into an octet string as [ 0.0.a.b ], where 'a'
      and 'b' are the network byte order encodings of the MSB and LSB
      of the socket value.

      Each IPX/PEP packet contains two sockets, source and destination.
      How these are mapped onto the single well-known socket value used
      to identify its children is beyond the scope of this document."
    REFERENCE
      "Novell Corporation"
    ::= {
     -- ipx 0x00     ** Many third party IPX's use this value always
     ipx 0x04        -- Xerox assigned for PEP
     -- ipx 0x11     ** Novell use this for PEP packets, often
    }

nov-spx PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
    hasChildren(0)
 }
    DESCRIPTION
      "Novell Sequenced Packet Exchange Protocol.  This protocol is an
      extension of IPX/PEP as it shares a common header."
    CHILDREN
      "Children of SPX are defined by the 16 bit socket values.  The
      value is encoded into an octet string as [ 0.0.a.b ], where 'a'
      and 'b' are the network byte order encodings of the MSB and LSB
      of the socket value.

      Each IPX/SPX packet contains two sockets, source and destination.
      How these are mapped onto the single well-known socket value used
      to identify its children is beyond the scope of this document."
    REFERENCE
      "Novell Corporation"
    ::= {
     ipx 0x05 -- Xerox assigned for SPX
    }

nov-sap PROTOCOL-IDENTIFIER
    PARAMETERS {
     tracksSessions(1)
    }
    ATTRIBUTES {
     hasChildren(0)
    }
```

```
    DESCRIPTION
       "Novell Service Advertising Protocol.  This protocol binds
       applications on a particular host to an IPX/PEP or IPX/SPX socket
       number.  Although it never truly acts as a transport protocol
       itself it is used to establish sessions between clients and
       servers and barring well-known sockets is the only reliable way
       to determine the protocol running over a given socket on a given
       machine."
    CHILDREN
       "Children of SAP are identified by a 16 bit service type.  They
       are encoded as [ 0.0.a.b ], where 'a' is the MSB and 'b' is the
       LSB of the service type.

       Children of SAP are named as 'nov-sap a' where 'a' is the service
       type in hexadecimal notation.  The novell NCP protocol is
       referred to as 'nov-sap ncp' OR 'nov-sap 0x0004'."
    DECODING
       "The first packet of any session for a SAP based application
       (almost all IPX/PEP and IPX/SPX based applications utilize SAP)
       is sent to the SAP server(s) to map the service type into a port
       number for the host(s) on which the SAP server(s) is(are)
       running.  These initial packets are SAP packets and not
       application packets and must be decoded accordingly.

       Having established the mapping, clients will then send
       application packets to the newly discovered socket number.  These
       must be decoded by 'remembering' the socket assignments
       transmitted in the SAP packets.

       In some cases the port mapping for a particular protocol is well
       known and SAP will always return the same socket number for that
       application.

       Such programs should still be declared as children of nov-sap as
       described under CHILDREN above.  How an implementation detects a
       client which is bypassing the SAP server to contact a well-known
       application is beyond the scope of this document.

       The 'tracksSessions(1)' PARAMETER bit is used to indicate whether
       the probe can (and should) monitor nov-sap activity to correctly
       track SAP-based connections."
    REFERENCE
       "A list of SAP service types can be found at
          ftp://ftp.isi.edu/in-notes/iana/assignments/novell-sap-
       numbers"
    ::= { nov-pep 0x0452 }

ncp PROTOCOL-IDENTIFIER
```

```
    PARAMETERS {
     tracksSessions(1)
    }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
       "Netware Core Protocol"
    CHILDREN
       "Children of NCP are identified by the 8 bit command type field.
       They are encoded as [ 0.0.0.a ] where 'a' is the command type
       value.

       Children of NCP are named as 'ncp a' where 'a' is the command
       type in decimal notation.  The NDS sub-protocol is referred to as
       'ncp nds' OR 'ncp 104'."
    DECODING
       "Only the NCP request frames carry the command type field.  How
       the implementation infers the command type of a response frame is
       an implementation specific matter and beyond the scope of this
       document.

       The tracksSessions(1) PARAMETERS bit indicates whether the probe
       can (and should) perform command type inference."
    REFERENCE
       "Novell Corporation"
    ::= { nov-sap 0x0004,
       nov-pep 0x0451 }

nds PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
         "The Netware Directory Services sub-protocol."
    REFERENCE
       "Novell Corporation"
    ::= { ncp 104 }

nov-diag PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Novell's diagnostic Protocol"
    REFERENCE
       "Novell Corporation"
    ::= {
     nov-sap 0x0017,   -- [ed., this is the right one]
     nov-pep 0x0456
```

```
    }

nov-sec PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Novell security - serialization - copy protection protocol."
    REFERENCE
       "Novell Corporation"
    ::= { nov-pep 0x0457 }

nov-watchdog PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Novell watchdog protocol."
    REFERENCE
       "Novell Corporation"
    ::= { nov-pep 0x4004 }

nov-bcast PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Novell broadcast protocol."
    REFERENCE
       "Novell Corporation"
    ::= { nov-pep 0x4005 }
```

3.1.3. The XEROX Protocol Stack

```
idp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
      hasChildren(0),
      addressRecognitionCapable(1)
    }
    DESCRIPTION
       "Xerox IDP"
    CHILDREN
       "Children of IDP are defined by the 8 bit value of the Packet
       type field.  The value is encoded into an octet string as [
       0.0.0.a ], where 'a' is the value of the packet type field in
       network byte order.

       Children of IDP are encoded as [ 0.0.0.a ], and named as 'idp a'
       where a is the packet type value.  The XNS SPP protocol is
       referred to as 'idp xns-spp' OR 'idp 2'."
```

```
    ADDRESS-FORMAT
       "4 bytes of Network number followed by the 6 bytes Host address
       each in network byte order."
    REFERENCE
       "Xerox Corporation, Document XNSS 028112, 1981"
    ::=  {
       ether2  0x600,     -- [ 0.0.6.0 ]
       snap    0x600,
       802-1Q  0x600      -- [ 0.0.6.0 ]
    }

xns-rip PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Routing Information Protocol."
    REFERENCE
       "Xerox Corporation"
    ::= { idp 1 }

xns-echo PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "XNS echo protocol."
    REFERENCE
       "Xerox Corporation"
    ::= { idp 2 }

xns-error PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "XNS error-handler protocol."
    REFERENCE
       "Xerox Corporation"
    ::= { idp 3 }

xns-pep PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0)

    }
    DESCRIPTION
       "XNS Packet Exchange Protocol."
    CHILDREN
       "Children of PEP are defined by the 16 bit socket values.  The
```

```
       value is encoded into an octet string as [ 0.0.a.b ], where 'a'
       and 'b' are the network byte order encodings of the MSB and LSB
       of the socket value.

       Each XNS/PEP packet contains two sockets, source and destination.
       How these are mapped onto the single well-known socket value used
       to identify its children is beyond the scope of this document."
    REFERENCE
       "Xerox Corporation"
    ::= { idp 4 }

xns-spp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
       "Sequenced Packet Protocol."
    CHILDREN
       "Children of SPP are defined by the 16 bit socket values.  The
       value is encoded into an octet string as [ 0.0.a.b ], where 'a'
       and 'b' are the network byte order encodings of the MSB and LSB
       of the socket value.

       Each XNS/SPP packet contains two sockets, source and destination.
       How these are mapped onto the single well-known socket value used
       to identify its children is beyond the scope of this document."
    REFERENCE
       "Xerox Corporation"
    ::= { idp 5 }
```

3.1.4. AppleTalk Protocol Stack

```
apple-oui PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Pseudo-protocol which binds Apple's protocols to vsnap."
    CHILDREN
       "Children of apple-oui are identified by the ether2 type field
       value that the child uses when encapsulated in ether2.  The value
       is encoded into an octet string as [ 0.0.a.b ], where 'a' and 'b'
       are the MSB and LSB of the 16-bit ether type value in network
       byte order."
    REFERENCE
       "AppleTalk Phase 2 Protocol Specification, document ADPA
        #C0144LL/A."
    ::=   {
```

```
     vsnap    0x080007,     --  [ 0.8.0.7 ]
     802-1Q   0x04080007    --  1Q-VSNAP [ 4.8.0.7 ]
    }

aarp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "AppleTalk Address Resolution Protocol."
    REFERENCE
       "AppleTalk Phase 2 Protocol Specification, document ADPA
        #C0144LL/A."
    ::=   {
     ether2    0x80f3,            --  [ 0.0.128.243 ]
     snap      0x80f3,
     apple-oui 0x80f3,
     802-1Q    0x80f3             --  [ 0.0.128.243 ]
    }

atalk PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0),
     addressRecognitionCapable(1)
    }
    DESCRIPTION
       "AppleTalk Protocol."
    CHILDREN
       "Children of ATALK are defined by the 8 bit value of the DDP type
       field.  The value is encoded into an octet string as [ 0.0.0.a ],
       where 'a' is the value of the DDP type field in network byte
       order."
    ADDRESS-FORMAT
       "2 bytes of Network number followed by 1 byte of node id each in
       network byte order."
    REFERENCE
       "AppleTalk Phase 2 Protocol Specification, document ADPA
        #C0144LL/A."
    ::=   {
     ether2     0x809b,   -- [ 0.0.128.155 ]
        apple-oui  0x809b,
     802-1Q     0x809b    -- [ 0.0.128.155 ]
    }

rtmp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
```

```
      "AppleTalk Routing Table Maintenance Protocol."
    REFERENCE
      "Apple Computer"
    ::= {
     atalk   0x01,       -- responses
     atalk   0x05        -- requests
    }

aep PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
      "AppleTalk Echo Protocol."
    REFERENCE
      "Apple Computer"
    ::= { atalk 0x04 }

nbp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
      "AppleTalk Name Binding Protocol."
    DECODING
      "In order to correctly identify the application protocol running
      over atp NBP packets must be analyzed.  The mechanism by which
      this is achieved is beyond the scope of this document."
    REFERENCE
      "Apple Computer"
    ::= { atalk 0x02 }

zip PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
      "AppleTalk Zone Information Protocol."
    REFERENCE
      "Apple Computer"
    ::= {
     atalk   0x06,
     atp     3
    }

atp PROTOCOL-IDENTIFIER
    PARAMETERS {
     tracksSessions(1)
    }
    ATTRIBUTES {
     hasChildren(0)
```

```
    }
    DESCRIPTION
       "AppleTalk Transaction Protocol."
    CHILDREN
       "Children of atp are identified by the following (32 bit)
       enumeration:
         1   asp (AppleTalk Session Protocol)
         2   pap (Printer Access Protocol)
         3   zip (Zone Information Protocol)
       Children of atp are encoded as [ a.b.c.d ] where 'a', 'b', 'c'
       and 'd' are the four octets of the enumerated value in network
       order (i.e. 'a' is the MSB and 'd' is the LSB).

       The ZIP protocol is referred to as 'atp zip' OR 'atp 3'."
    DECODING
       "An implementation is encouraged to examine both the socket
       fields in the associated DDP header as well as the contents of
       prior NBP packets in order to determine which (if any) child is
       present.  A full description of this algorithm is beyond the
       scope of this document.  The tracksSessions(1) PARAMETER
       indicates whether the probe can (and should) perform this
       analysis."
    REFERENCE
       "Apple Computer"
    ::= { atalk 0x03 }

adsp PROTOCOL-IDENTIFIER
    PARAMETERS {
     tracksSessions(1)
    }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
       "AppleTalk Data Stream Protocol."
    CHILDREN
       "Children of adsp are identified by enumeration.  At this time
       none are known."
    DECODING
       "An implementation is encouraged to examine the socket numbers in
       the associated DDP header as well as the contents of prior NBP
       packets in order to determine which (if any) child of ADSP is
       present.

       The mechanism by which this is achieved is beyond the scope of
       this document.

       The tracksSessions(1) PARAMETER indicates whether the probe can
```

```
      (and should) perform this analysis."
    REFERENCE
      "Apple Computer"
    ::= { atalk 0x07 }

asp PROTOCOL-IDENTIFIER
 PARAMETERS { }
    ATTRIBUTES {
  hasChildren(0)
 }
    DESCRIPTION
      "AppleTalk Session Protocol."
    CHILDREN
      "Children of asp are identified by the following (32 bit)
      enumeration:
        1   afp (AppleTalk Filing Protocol)
      Children of asp are encoded as [ a.b.c.d ] where 'a', 'b', 'c'
      and 'd' are the four octets of the enumerated value in network
      order (i.e. 'a' is the MSB and 'd' is the LSB).

      The AFP protocol is referred to as 'asp afp' OR 'asp 1'."
    DECODING
      "ASP is a helper layer to assist in building client/server
      protocols.  It cooperates with ATP to achieve this; the
      mechanisms used when decoding ATP apply equally here (i.e.
      checking DDP socket numbers and tracking NBP packets).

      Hence the tracksSessions(1) PARAMETER of atp applies to this
      protocol also."
    REFERENCE
      "Apple Computer"
    ::= { atp 1 }

afp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
        "AppleTalk Filing Protocol."
    REFERENCE
      "Apple Computer"
    ::= { asp 1 }

pap PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
      "AppleTalk Printer Access Protocol."
    REFERENCE
```

```
      "Apple Computer"
    ::= { atp 2 }
```

3.1.5. Banyon Vines Protocol Stack

```
vtr PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
       "Banyan Vines Token Ring Protocol Header."
    CHILDREN
       "Children of vines-tr are identified by the 8 bit packet type
       field.  Children are encoded as [ 0.0.0.a ] where 'a' is the
       packet type value.

       The vines-ip protocol is referred to as 'vines-tr vip' OR 'vines-
       tr 0xba'."
    REFERENCE
       "See vip."
    ::= {
     llc          0xBC,      -- declared as any LLC, but really TR only.
     802-1Q       0x020000BC   -- 1Q-LLC [2.0.0.188]
    }

vecho PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Banyan Vines data link level echo protocol."
    REFERENCE
       "See vip."
    ::= {
     ether2      0x0BAF,      -- [0.0.11.175]
     snap        0x0BAF,
     -- vfrp     0x0BAF,
     vtr         0xBB,        -- [ed. yuck!]
     802-1Q      0x0BAF       -- [0.0.11.175]
     }

vip PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0),
     addressRecognitionCapable(1)
    }
    DESCRIPTION
```

```
      "Banyan Vines Internet Protocol."
    CHILDREN
      "Children of vip are selected by the one-byte 'protocol type'
      field located at offset 5 in the vip header.  The value is
      encoded as [ 0.0.0.a ], where a is the 'protocol type.'  For
      example, a protocolDirId fragment of:

         0.0.0.1.0.0.11.173.0.0.0.1

       identifies an encapsulation of vipc (ether2.vip.vipc)."
    ADDRESS-FORMAT
      "vip packets have 6-byte source and destination addresses.  The
      destination address is located at offset 6 in the vip header, and
      the source address at offset 12.  These are encoded in network
      byte order."
    REFERENCE
      "Vines Protocol Definition - part# 092093-001, order# 003673

       BANYAN,
       120 Flanders Road,
       Westboro, MA 01581 USA"
    ::= {
     ether2  0x0BAD,
     snap    0x0BAD,
     -- vfrp 0x0BAD,
     vtr     0xBA,        -- [ed. yuck!]
     802-1Q  0x0BAD       -- [0.0.11.173]
    }

varp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
      "Banyan Vines Address Resolution Protocol."
    REFERENCE
      "BANYAN"
    ::= { vip 0x04 }

vipc PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
      "Banyan Vines Interprocess Communications Protocol."
    CHILDREN
      "Children of Vines IPC are identified by the packet type field at
      offset 4 in the vipc header.
```

```
      These are encoded as [ 0.0.0.a ] where 'a' is the packet type
      value.  Children of vipc are defined as 'vipc a' where 'a' is the
      packet type value in hexadecimal notation.

      The Vines Reliable Data Transport protocol is referred to as
      'vipc vipc-rdp' OR 'vipc 0x01'."
   DECODING
      "Children of vipc are deemed to start at the first byte after the
      packet type field (i.e. at offset 5 in the vipc header)."
   REFERENCE
      "BANYAN"
   ::= { vip 0x01 }

-- Banyan treats vipc, vipc-dgp and vipc-rdp as one protocol, IPC.
-- Vines IPC really comes in two flavours.  The first is used to
-- send unreliable datagrams (vipc packet type 0x00).  The second
-- used to send reliable datagrams (vipc packet type 0x01),
-- consisting of up to four actual packets.
-- In order to distinguish between these we need two 'virtual'
-- protocols to identify which is which.

vipc-dgp PROTOCOL-IDENTIFIER
   PARAMETERS { }
   ATTRIBUTES {
    hasChildren(0)
    }
   DESCRIPTION
      "Vines Unreliable Datagram Protocol."
   CHILDREN
      "Children of vipc-dgp are identified by the 16 bit port numbers
      contained in the vipc (this protocol's parent protocol) header.

      These are encoded as [ 0.0.a.b ] where 'a' is the MSB and 'b' is
      the MSB of the port number in network byte order.

      Children of vipc-dgp are defined as 'vipc-dgp a' where 'a' is the
      port number in hexadecimal notation.

      The StreetTalk protocol running over vipc-dgp would be referred
      to as 'vipc-dgp streettalk' OR 'vipc-dgp 0x000F'.

      The mechanism by which an implementation selects which of the
      source and destination ports to use in determining which child
      protocol is present is implementation specific and beyond the
      scope of this document."
   DECODING
      "Children of vipc-dgp are deemed to start after the single
      padding byte found in the vipc header.  In the case of vipc-dgp
```

```
       the vipc header is a so called 'short' header, total length 6
       bytes (including the final padding byte)."
    REFERENCE
       "BANYAN"
    ::= { vipc 0x00 }

vipc-rdp PROTOCOL-IDENTIFIER
    PARAMETERS {
     countsFragments(0)
    }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
       "Vines Reliable Datagram Protocol."
    CHILDREN
       "Children of vipc-rdp are identified by the 16 bit port numbers
       contained in the vipc (this protocol's parent protocol) header.

       These are encoded as [ 0.0.a.b ] where 'a' is the MSB and 'b' is
       the MSB of the port number in network byte order.

       Children of vipc-dgp are defined as 'vipc-rdp a' where 'a' is the
       port number in hexadecimal notation.

       The StreetTalk protocol running over vipc-rdp would be referred
       to as 'vipc-rdp streettalk' OR 'vipc-rdp 0x000F'.

       The mechanism by which an implementation selects which of the
       source and destination ports to use in determining which child
       protocol is present is implementation specific and beyond the
       scope of this document."
    DECODING
       "Children of vipc-rdp are deemed to start after the error/length
       field at the end of the vipc header.  For vipc-rdp the vipc
       header is a so called 'long' header, total 16 bytes (including
       the final error/length field).

       vipc-rdp includes a high level fragmentation scheme which allows
       up to four vipc packets to be sent as a single atomic PDU.  The
       countsFragments(0) PARAMETERS bit indicates whether the probe can
       (and should) identify the child protocol in all fragments or only
       the leading one."
    REFERENCE
       "BANYAN"
    ::= { vipc 0x01 }

vspp PROTOCOL-IDENTIFIER
```

```
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
         "Banyan Vines Sequenced Packet Protocol."
    CHILDREN
       "Children of vspp are identified by the 16 bit port numbers
       contained in the vspp header.

       These are encoded as [ 0.0.a.b ] where 'a' is the MSB and 'b' is
       the MSB of the port number in network byte order.

       Children of vspp are defined as 'vspp a' where 'a' is the port
       number in hexadecimal notation.

       The StreetTalk protocol running over vspp would be referred to as
       'vspp streettalk' OR 'vspp 0x000F'.

       The mechanism by which an implementation selects which of the
       source and destination ports to use in determining which child
       protocol is present is implementation specific and beyond the
       scope of this document."
    DECODING
       "The implementation must ensure only those vspp packets which
       contain application data are decoded and passed on to children.
       Although it is suggested that the packet type and control fields
       should be used to determine this fact it is beyond the scope of
       this document to fully define the algorithm used."
    REFERENCE
       "BANYAN"
    ::= { vip 0x02 }

vrtp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Banyan Vines Routing Update Protocol."
    REFERENCE
       "BANYAN"
    ::= { vip 0x05 }

vicp PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Banyan Vines Internet Control Protocol."
    REFERENCE
```

```
      "BANYAN"
    ::= { vip 0x06 }
```

3.1.6. The DECNet Protocol Stack

```
dec PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DEC"
    REFERENCE
       "Digital Corporation"
    ::= {
     ether2 0x6000,
     802-1Q 0x6000      -- [0.0.96.0]
    }

lat PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DEC Local Area Transport Protocol."
    REFERENCE
       "Digital Corporation"
    ::= {
     ether2 0x6004,
     802-1Q 0x6004      -- [0.0.96.4]
    }

mop PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DEC Maintenance Operations Protocol."
    REFERENCE
       "Digital Corporation"
    ::= {
     ether2 0x6001,     -- mop dump/load
     ether2 0x6002,     -- mop remote console
     802-1Q 0x6001,     -- [0.0.96.1]  VLAN + mop dump/load
     802-1Q 0x6002      -- [0.0.96.2]  VLAN + mop remote console
    }

dec-diag PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DEC Diagnostic Protocol."
```

```
    REFERENCE
       "Digital Corporation"
    ::= {
     ether2 0x6005,
     802-1Q 0x6005     -- [0.0.96.5]
    }

lavc PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DEC Local Area VAX Cluster Protocol."
    REFERENCE
       "Digital Corporation"
    ::= {
     ether2 0x6007,
     802-1Q 0x6007         -- [0.0.96.7]
    }

drp PROTOCOL-IDENTIFIER
    PARAMETERS {
     countsFragments(1)
    }
    ATTRIBUTES {
     hasChildren(0),
     addressRecognitionCapable(1)
    }
    DESCRIPTION
       "DEC Routing Protocol."

    CHILDREN
       "There is only one child of DRP, NSP.  This is encoded as [
       0.0.0.1 ]."
    ADDRESS-FORMAT
       "There are three address formats used in DRP packets, 2-byte
       (short data packet and all control except ethernet endnode &
       router hello messages), 6-byte (ethernet router & endnode hello
       messages) and 8-byte (long data packet).  All of these contain
       the 2-byte format address in the last 2 bytes with the remaining
       bytes being unimportant for the purposes of system
       identification.  It is beyond the scope of this document to
       define the algorithms used to identify packet types and hence
       address formats.

       The 2-byte address format is the concatenation of a 6-bit area
       and a 10-bit node number.  In all cases this is placed in little
       endian format (i.e. LSB, MSB).  The probe, however, will return
       them in network order (MSB, LSB).  Regardless of the address
```

```
       format in the packet, the probe will always use the 2-byte
       format.

       For example area=13 (001101) and node=311 (0100110111) gives:
         0011 0101 0011 0111 = 0x3537 in network order (the order the
         probe should return the address in).

         In packets this same value would appear as (hex):

          2-byte  37 35
          6-byte  AA 00 04 00 37 35
          8-byte  00 00 AA 00 04 00 37 35

       Notice that the AA 00 04 00 prefix is defined in the
       specification but is unimportant and should not be parsed.

       Notice that control messages only have a source address in the
       header and so they can never be added into the conversation based
       tables."
    DECODING
       "NSP runs over DRP data packets; all other packet types are DRP
       control packets of one sort or another and do not carry any
       higher layer protocol.

       NSP packets are deemed to start at the beginning of the DRP data
       area.

       Data packets may be fragmented over multiple DRP data packets.
       The countsFragments(1) parameter indicates whether a probe can
       (and should) attribute non-leading fragments to the child
       protocol (above NSP in this case) or not.

       Recognition of DRP data packets and fragments is beyond the scope
       of this document."
    REFERENCE
       "DECnet Digital Network Architecture
         Phase IV
         Routing Layer Functional Specification
         Order# AA-X435A-TK
         Digital Equipment Corporation, Maynard, Massachusetts, USA"
    ::= {
     ether2  0x6003,
     snap    0x6003,
     802-1Q  0x6003     -- [0.0.96.3]
    }

nsp PROTOCOL-IDENTIFIER
    PARAMETERS {
```

```
     tracksSessions(1)
    }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
       "DEC Network Services Protocol."
    CHILDREN
       "Children of NSP are identified by the SCP 8-bit object type.
       Notice that the object type is included only in the session
       establishment messages (connect initiate, retransmitted connect
       initiate).

       Children of NSP are encoded [ 0.0.0.a ] where 'a' is the SCP
       object type.  Children of NSP are named as 'nsp' followed by the
       SCP object type in decimal.  CTERM is referred to as 'nsp cterm'
       OR 'nsp 42'."
    DECODING
       "An implementation is encouraged to examine SCP headers included
       in NSP control messages in order to determine which child
       protocol is present over a given session.  It is beyond the scope
       of this document to define the algorithm used to do this.

       The tracksSessions(1) flag indicates whether the probe can (and
       should) perform this analysis."
    REFERENCE
       "DECnet Digital Network Architecture
         Phase IV
         NSP Functional Specification
         Order# AA-X439A-TK
         Digital Equipment Corporation, Maynard, Massachusetts, USA"
    ::= { drp 1 }

dap-v1 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DEC Data Access Protocol version 1."
    REFERENCE
       "Digital Corporation"
    ::= { nsp 1 }

dap-v4 PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DEC Data Access Protocol versions 4 and above."
    REFERENCE
```

```
       "Digital Corporation"
    ::= { nsp 17 }

nice PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DEC Network Information and Control Exchange protocol."
    REFERENCE
       "Digital Corporation"
    ::= { nsp 19 }

dec-loop PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DEC Loopback Protocol."
    REFERENCE
       "Digital Corporation"
    ::= { nsp 25 }

dec-event PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DEC Event Protocol."
    REFERENCE
       "Digital Corporation"
    ::= { nsp 26 }

cterm PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "DEC CTERM Protocol."
    REFERENCE
       "Digital Corporation"
    ::= { nsp 42 }
```

3.1.7. The IBM SNA Protocol Stack.

```
sna-th PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "IBM's SNA TH protocol."
    REFERENCE
       "IBM Systems Network Architecture
```

```
         Format and Protocol
         Reference Manual: Architectural Logic

         SC30-3112-2

         IBM System Communications Division,
         Publications Development,
         Department E02,
         PO Box 12195,
         Research Triangle Park,
         North Carolina 27709."
    ::= {
     llc        0x04,              -- [0.0.0.4]
     llc        0x08,              -- [0.0.0.8]
     llc        0x0c,              -- [0.0.0.12]
        ether2     0x80d5,            -- [0.0.128.213]
     802-1Q     0x02000004,        -- 1Q-LLC [2.0.0.4]
     802-1Q     0x02000008,        -- 1Q-LLC [2.0.0.8]
     802-1Q     0x0200000c,        -- 1Q-LLC [2.0.0.12]
        802-1Q     0x80d5             -- [0.0.128.213]
    }
```

3.1.8. The NetBEUI/NetBIOS Family

```
-- CHILDREN OF NETBIOS
-- The NetBIOS/NetBEUI functions are implemented over a wide variety of
-- transports.  Despite varying implementations they all share two
-- features.  First, all sessions are established by connecting to
-- locally named services.  Second, all sessions transport application
-- data between the client and the named service.  In all cases the
-- identification of the application protocol carried within the data
-- packets is beyond the scope of this document.]
--
-- Children of NetBIOS/NetBEUI are identified by the following (32 bit)
-- enumeration
--
--      1   smb (Microsoft's Server Message Block Protocol)
--      2   notes (Lotus' Notes Protocol)
--      3   cc-mail (Lotus' CC Mail Protocol)
--
-- Children of NetBIOS/NetBEUI are encoded as [ a.b.c.d ] where 'a', 'b',
-- 'c' and 'd' are the four octets of the enumerated value in network
-- order (i.e.  'a' is the MSB and 'd' is the LSB).
--
-- For example notes over NetBEUI is declared as
--      'notes ::= { netbeui 2 }'
-- but is referred to as
--      'netbeui notes' OR 'netbeui 2'.
```

```
netbeui PROTOCOL-IDENTIFIER
    PARAMETERS {
     tracksSessions(1)
    }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
       "Lan Manager NetBEUI protocol."

    CHILDREN
       "See 'CHILDREN OF NETBIOS'"
    DECODING
       "NETBEUI provides a named service lookup function.  This function
       allows clients to locate a service by (locally assigned) name.
       An implementation is encouraged to follow lookups and session
       establishments and having determined the child protocol, track
       them.

       How the child protocol is determined and how the sessions are
       tracked is an implementation specific matter and is beyond the
       scope of this document."
    REFERENCE
       "IBM"
    ::= {
     llc        0xF0,          --  [0.0.0.240]
     802-1Q     0x020000F0     --  1Q-LLC [2.0.0.240]
    }

nbt-name PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "NetBIOS-over-TCP name protocol."
    REFERENCE
       "RFC 1001 [RFC1001] defines the 'PROTOCOL STANDARD FOR A NetBIOS
       SERVICE ON A TCP/UDP TRANSPORT: CONCEPTS AND METHODS.'  RFC 1002
       [RFC1002] defines the 'PROTOCOL STANDARD FOR A NetBIOS SERVICE ON
       A TCP/UDP TRANSPORT: DETAILED SPECIFICATIONS'."
    ::= {
     udp     137,
     tcp     137
    }

nbt-session PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
```

```
       "NetBIOS-over-TCP session protocol."
    REFERENCE
       "RFC 1001 [RFC1001] defines the 'PROTOCOL STANDARD FOR A NetBIOS
       SERVICE ON A TCP/UDP TRANSPORT: CONCEPTS AND METHODS.'  RFC 1002
       [RFC1002] defines the 'PROTOCOL STANDARD FOR A NetBIOS SERVICE ON
       A TCP/UDP TRANSPORT: DETAILED SPECIFICATIONS'."
    ::= {

     udp     139,
     tcp     139
    }

nbt-data PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
       "NetBIOS-over-TCP datagram protocol."
    CHILDREN
       "See 'CHILDREN OF NETBIOS'"
    REFERENCE
       "RFC 1001 [RFC1001] defines the 'PROTOCOL STANDARD FOR A NetBIOS
       SERVICE ON A TCP/UDP TRANSPORT: CONCEPTS AND METHODS.'  RFC 1002
       [RFC1002] defines the 'PROTOCOL STANDARD FOR A NetBIOS SERVICE ON
       A TCP/UDP TRANSPORT: DETAILED SPECIFICATIONS'."
    ::= {
     udp     138,
     tcp     138
    }

netbios-3com PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
       "3COM NetBIOS protocol."
    CHILDREN
       "See 'CHILDREN OF NETBIOS'"
    REFERENCE
       "3Com Corporation"
    ::= {
     ether2  0x3C00,
     ether2  0x3C01,
     ether2  0x3C02,
     ether2  0x3C03,
     ether2  0x3C04,
```

```
     ether2  0x3C05,
     ether2  0x3C06,
     ether2  0x3C07,
     ether2  0x3C08,
     ether2  0x3C09,
     ether2  0x3C0A,
     ether2  0x3C0B,
     ether2  0x3C0C,
     ether2  0x3C0D,
     802-1Q  0x3C00,
     802-1Q  0x3C01,
     802-1Q  0x3C02,
     802-1Q  0x3C03,
     802-1Q  0x3C04,
     802-1Q  0x3C05,
     802-1Q  0x3C06,
     802-1Q  0x3C07,
     802-1Q  0x3C08,
     802-1Q  0x3C09,
     802-1Q  0x3C0A,
     802-1Q  0x3C0B,
     802-1Q  0x3C0C,
     802-1Q  0x3C0D
    }

nov-netbios PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES {
     hasChildren(0)
    }
    DESCRIPTION
       "Novell's version of the NetBIOS protocol."
    CHILDREN
       "See 'CHILDREN OF NETBIOS'"
    REFERENCE
       "Novell Corporation"
    ::= {
     nov-sap 0x0020,  -- preferred encapsulation to use, even though
                      -- the following are typically used also
     -- ipx  0x14,       -- when reached by IPX packet type
     -- nov-pep 0x0455   -- when reached by socket number
    }

burst PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Novell burst-mode transfer"
```

```
    REFERENCE

       "Novell Corporation"
    ::= { nov-pep 0x0d05 }
```

3.2. Multi-stack protocols

```
smb PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Microsoft Server Message Block Protocol."
    REFERENCE
       "Microsoft Corporation"
    ::= {
        netbeui         1,
        netbios-3com    1,
        nov-netbios     1,
        nbt-data        1,
        nbt-session     1,
        nov-pep         0x550,
        nov-pep         0x552
    }

notes PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Lotus Notes Protocol."
    REFERENCE
       "Lotus Development"
    ::= {
     netbeui         2,
     netbios-3com    2,
     nov-netbios     2,
     nbt-data        2,
     tcp             1352,
     udp             1352,
        nov-sap         0x039b
    }

ccmail PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }

    DESCRIPTION
       "Lotus CC-mail Protocol."
    REFERENCE
```

```
       "Lotus Development"
    ::= {
     netbeui         3,
     netbios-3com    3,
     nov-netbios     3,
     nbt-data        3,
     tcp             3264,
     udp             3264
    }

snmp  PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Simple Network Management Protocol. Includes SNMPv1 and SNMPv2
       protocol versions. Does not include SNMP trap packets."
    REFERENCE
       "The SNMP SMI is defined in RFC 1902 [RFC1902].  Version 1 of the
       SNMP  protocol is defined in RFC 1905 [RFC1905].  Transport
       mappings are defined in RFC 1906 [RFC1906]; RFC 1420 (SNMP over
       IPX) [RFC1420]; RFC 1419 (SNMP over AppleTalk) [RFC1419]."
    ::= {
     udp 161,
        nov-pep 0x900f,   -- [ 0.0.144.15 ]
     atalk 8,
     tcp 161
    }

snmptrap PROTOCOL-IDENTIFIER
    PARAMETERS { }
    ATTRIBUTES { }
    DESCRIPTION
       "Simple Network Management Protocol Trap Port."
    REFERENCE
       "The SNMP SMI is defined in RFC 1902 [RFC1902].  The SNMP
       protocol is defined in RFC 1905 [RFC1905].  Transport mappings
       are defined in RFC 1906 [RFC1906]; RFC 1420 (SNMP over IPX)
       [RFC1420]; RFC 1419 (SNMP over AppleTalk) [RFC1419]."
    ::= {
     udp 162,
        nov-pep 0x9010,
     atalk 9,
     tcp 162
    }

-- END
```

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7. Security Considerations

This document contains textual descriptions of well-known networking protocols, not the definition of any networking behavior. As such, no security considerations are raised by its publication.

8. Authors' Addresses

Andy Bierman
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA USA 95134

Phone: +1 408-527-3711
EMail: abierman@cisco.com

Chris Bucci
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA USA 95134

Phone: +1 408-527-5337
EMail: cbucci@cisco.com

Robin Iddon
c/o 3Com Inc.
Blackfriars House
40/50 Blackfrias Street
Edinburgh, EH1 1NE, UK

Phone: +44 131.558.3888
EMail: None

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