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## Remote Network Monitoring MIB Protocol Identifier Macros

### Status of this Memo

This memo provides information for the Internet community. It does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

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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:

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

- o 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 =
    12.0.0.0.1.0.0.8.0.0.0.0.0.17.3.0.0.0 "
```

## 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-neighborings 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 =
```

```

        12.0.0.0.1.0.0.8.0.0.0.0.0.17.3.0.0.0 "
```

```

  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 &lt;JNC@XX.LCS.MIT.EDU&gt;"

```

::= {
  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
}

nhrrp 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 (OSPF)."
```

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-encrypt 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)."
```

```
::= {  
    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 }
```

gotd 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 }
```

mss 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 }

## nickname 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 Mail 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-termink 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 }
```

```
cfdpkt PROTOCOL-IDENTIFIER
PARAMETERS { }
ATTRIBUTES { }
DESCRIPTION
    "CFDPKT; 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 SYSMANT"
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)."
```

```
    "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. Banyan 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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## 6. References

- [IEN158] J. Haverty, "XNET Formats for Internet Protocol Version 4", IEN 158, October 1980.
- [RFC407] Bressler, R., Guida, R. and A. McKenzie, "Remote Job Entry Protocol", RFC 407, October 1972.
- [RFC493] Michener, J., Cotton, I., Kelley, K., Liddle, D. and E. Meyer, "E.W., Jr Graphics Protocol", RFC 493, April 1973.
- [RFC734] Crispin, M., "SUPDUP Protocol", RFC 734, October 1977.
- [RFC740] Braden, R., "NETRJS Protocol", RFC 740, November 1977.
- [RFC741] Cohen, D., "Specifications for the Network Voice Protocol", RFC 741, ISI/RR 7539, March 1976.
- [RFC759] Postel, J., "Internet Message Protocol", RFC 759, August 1980.
- [RFC768] Postel, J., "User Datagram Protocol", STD 6, RFC 768, August 1980.
- [RFC791] Postel, J., "Internet Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 791, September 1981.
- [RFC792] Postel, J., "Internet Control Message Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 792, September 1981.
- [RFC793] Postel, J., "Transmission Control Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 793, September 1981.
- [RFC818] Postel, J., "Remote User Telnet service", RFC 818, November 1982.
- [RFC821] Postel, J., "Simple Mail Transfer Protocol", STD 10, RFC 821, August 1982.
- [RFC823] Hinden, R. and A. Sheltzer, "The DARPA Internet Gateway", RFC 823, September 1982.
- [RFC826] Plummer, D., "An Ethernet Address Resolution Protocol or Converting Network Protocol Addresses to 48-bit Ethernet Addresses for Transmission on Ethernet Hardware", STD 37, RFC 826, November 1982.

- [RFC854] Postel, J. and J. Reynolds, "Telnet Protocol Specification", STD 8, RFC 854, May 1983.
- [RFC862] Postel, J., "Echo Protocol", STD 20, RFC 862, May 1983.
- [RFC863] Postel, J., "Discard Protocol", STD 21, RFC 863, May 1983.
- [RFC864] Postel, J., "Character Generator Protocol", STD 22, RFC 864, May 1983.
- [RFC865] Postel, J., "Quote of the Day Protocol", STD 23, RFC 865, May 1983.
- [RFC866] Postel, J., "Active Users", STD 26, RFC 866, May 1983.
- [RFC867] Postel, J., "Daytime Protocol", STD 25, RFC 867, May 1983.
- [RFC868] Postel, J., "Time Protocol", STD 26, RFC 868, May 1983.
- [RFC869] Hinden, R., "A Host Monitoring Protocol", RFC 869, December 1983.
- [RFC887] Accetta, M., "Resource Location Protocol", RFC 887, December 1983.
- [RFC904] International Telegraph and Telephone Co., D. Mills, "Exterior Gateway Protocol Formal Specification", STD 18, RFC 904, April 1984.
- [RFC905] McKenzie, A., "ISO Transport Protocol Specification - ISO DP 8073", RFC 905, April 1984.
- [RFC908] Velten, D., Hinden, R., and J. Sax, "Reliable Data Protocol", RFC 908, July 1984.
- [RFC913] Lottor, M., "Simple File Transfer Protocol", RFC 913, September 1984.
- [RFC915] Elvy, M. and R. Nedved, "Network mail path service", RFC 915, December 1984.
- [RFC937] Butler, M., Chase, D., Goldberger, J., Postel, J., and J. Reynolds, "Post Office Protocol - version 2", RFC 937, February 1985.
- [RFC938] Miller, T., "Internet Reliable Transaction Protocol", RFC 938, February 1985.

- [RFC951] Croft, W. and J. Gilmore, "BOOTSTRAP Protocol (BOOTP)", RFC 951, September 1985.
- [RFC953] Feinler, E., Harrenstien, K. and M. Stahl, "Hostname Server", RFC 953, October 1985.
- [RFC954] Feinler, E., Harrenstien, K. and M. Stahl, "NICNAME/WHOIS", RFC 954, October 1985.
- [RFC959] Postel, J., and J. Reynolds, "File Transfer Protocol", STD 9, RFC 959, October 1985.
- [RFC972] Wancho, F., "Password Generator Protocol", RFC 972, January 1986.
- [RFC977] Kantor, B. and P. Lapsley, "Network News Transfer Protocol: A Proposed Standard for the Stream-Based Transmission of News", RFC 977, February 1986.
- [RFC996] Mills, D., "Statistics server", RFC 996, February 1987.
- [RFC998] Clark, D., Lambert, M. and L. Zhang, "NETBLT: A Bulk Data Transfer Protocol", RFC 998, March 1987.
- [RFC1001] NetBIOS Working Group in the Defense Advanced Research Projects Agency, Internet Activities Board, End-to-End Services Task Force. "Protocol standard for a NetBIOS service on a TCP/UDP transport: Concepts and methods", STD 19, RFC 1001, March 1987.
- [RFC1002] NetBIOS Working Group in the Defense Advanced Research Projects Agency, Internet Activities Board, End-to-End Services Task Force. "Protocol standard for a NetBIOS service on a TCP/UDP transport: Detailed specifications.", STD 19, RFC 1002, March 1987.
- [RFC1021] Partridge, C. and G. Trewitt, "High-level Entity Management System HEMS", RFC 1021, October 1987.
- [RFC1028] Case, J., Davin, J., Fedor, M. and M. Schoffstall, "Simple Gateway Monitoring Protocol", RFC 1028, November 1987.
- [RFC1035] Mockapetris, P., "Domain Names - Implementation and Specification", STD 13, RFC 1035, November 1987.
- [RFC1056] Lambert, M., "PCMAIL: A distributed mail system for personal computers", RFC 1056, June 1988.

- [RFC1057] Sun Microsystems, Inc, "RPC: Remote Procedure Call Protocol Specification version 2", RFC 1057, June 1988.
- [RFC1064] Crispin, M., "Interactive Mail Access Protocol: Version 2", RFC 1064, July 1988.
- [RFC1068] DeSchon, A. and R. Braden, "Background File Transfer Program BFTP", RFC 1068, August 1988.
- [RFC1070] Hagens, R., Hall, N. and M. Rose, "Use of the Internet as a subnetwork for experimentation with the OSI network layer", RFC 1070, February 1989.
- [RFC1078] Lottor, M., "TCP port service Multiplexer TCPMUX", RFC 1078, November, 1988.
- [RFC1086] Onions, J. and M. Rose, "ISO-TP0 bridge between TCP and X.25", RFC 1086, December 1988.
- [RFC1095] Warriier, U. and L. Besaw, "Common Management Information Services and Protocol over TCP/IP (CMOT)", RFC 1095, April 1989.
- [RFC1112] Deering, S., "Host Extensions for IP Multicasting", STD 5, RFC 1112, August 1989.
- [RFC1155] Rose, M. and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based Internets", STD 16, RFC 1155, May 1990.
- [RFC1157] Case, J., Fedor, M., Schoffstall, M. and J. Davin, "Simple Network Management Protocol", STD 15, RFC 1157, May 1990.
- [RFC1203] Rice, J., "Interactive Mail Access Protocol - Version 3", RFC 1203, February 1991.
- [RFC1204] Lee, D. and S. Yeh, "Message Posting Protocol (MPP)", RFC 1204, February 1991.
- [RFC1212] Rose, M. and K. McCloghrie, "Concise MIB Definitions", STD 16, RFC 1212, March 1991.
- [RFC1213] McCloghrie, K. and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets: MIB-II", STD 17, RFC 1213, March 1991.
- [RFC1215] Rose, M., "A Convention for Defining Traps for use with the SNMP", RFC 1215, March 1991.

- [RFC1226] Kantor, B., "Internet Protocol Encapsulation of AX.25 Frames", RFC 1226, May 1991.
- [RFC1227] Rose, M., "SNMP MUX Protocol and MIB", RFC 1227, May 1991.
- [RFC1234] Provan, D., "Tunneling IPX Traffic through IP Networks", RFC 1234, June 1991.
- [RFC1235] Ioannidis, J. and G. Maguire, Jr., "The Coherent File Distribution Protocol", RFC 1235, June 1991.
- [RFC1241] Mills, D. and R. Woodburn, "A Scheme for an Internet Encapsulation Protocol: Version 1", RFC 1241, July 1991.
- [RFC1249] Howes, T., Smith, M. and B. Beecher, "DIXIE Protocol Specification", RFC 1249, August 1991.
- [RFC1267] Lougheed, K. and Y. Rekhter, "A Border Gateway Protocol 3 (BGP-3)", RFC 1267, October 1991.
- [RFC1282] Kantor, B., "BSD Rlogin", RFC 1282, December 1991.
- [RFC1288] Zimmerman, D., "The Finger User Information Protocol", RFC 1288, December 1991.
- [RFC1301] Armstrong, S., Freier, A. and K. Marzullo, "Multicast Transport Protocol", RFC 1301, February 1992.
- [RFC1305] Mills, D., "Network Time Protocol (v3)", RFC 1305, April 1992.
- [RFC1312] Nelson, R. and G. Arnold, "Message Send Protocol", RFC 1312, April 1992.
- [RFC1339] Dorner, S. and P. Resnick, "Remote Mail Checking Protocol", RFC 1339, June 1992.
- [RFC1350] Sollins, K., "TFTP Protocol (revision 2)", RFC 1350, July 1992.
- [RFC1413] St. Johns, M., "Identification Protocol", RFC 1413, February 1993.
- [RFC1419] Minshall, G. and M. Ritter, "SNMP over AppleTalk", RFC 1419, March 1993.
- [RFC1420] Bostock, S., "SNMP over IPX", RFC 1420, March 1993.

- [RFC1436] Anklesaria, F., McCahill, M., Lindner, P., Johnson, D., John, D., Torrey, D. and B. Alberti, "The Internet Gopher Protocol (a distributed document search and retrieval protocol)", RFC 1436, March 1993.
- [RFC1459] Oikarinen, J. and D. Reed, "Internet Relay Chat Protocol", RFC 1459, May 1993.
- [RFC1476] Ullmann, R., "RAP: Internet Route Access Protocol", RFC 1476, June 1993.
- [RFC1479] Steenstrup, M., "Inter-Domain Policy Routing Protocol Specification: Version 1", RFC 1479, July 1993.
- [RFC1483] Heinanen, J., "Multiprotocol Encapsulation over ATM Adaptation Layer 5", RFC 1483, July 1993.
- [RFC1492] Finseth, C., "An Access Control Protocol, Sometimes Called TACACS", RFC 1492, July 1993.
- [RFC1510] Kohl, J. and B. Neuman, "The Kerberos Network Authentication Service (V5)", RFC 1510, September 1993.
- [RFC1583] Moy, J., "OSPF Version 2", RFC 1583, March 1994.
- [RFC1700] Reynolds, J. and J. Postel, "Assigned Numbers", STD 2, RFC 1700, October 1994.
- [RFC1701] Hanks, S., Li, T., Farinacci, D. and P. Traina, "Generic Routing Encapsulation (GRE)", RFC 1701, October 1994.
- [RFC1702] Hanks, S., Li, T., Farinacci, D. and P. Traina, "Generic Routing Encapsulation over IPv4 networks", RFC 1702, October 1994.
- [RFC1725] Myers, J. and M. Rose, "Post Office Protocol - Version 3", RFC 1725, November 1994.
- [RFC1729] Lynch, C., "Using the Z39.50 Information Retrieval Protocol in the Internet Environment", RFC 1729, December 1994.
- [RFC1730] Crispin, M., "Internet Message Access Protocol - Version 4", RFC 1730, December 1994.
- [RFC1739] Kessler, G. and S. Shepard, "A Primer On Internet and TCP/IP Tools", RFC 1739, December 1994.

- [RFC1745] Varadhan, K., Hares, S. and Y. Rekhter, "BGP4/IDRP for IP---OSPF Interaction", RFC 1745, December 1994.
- [RFC1757] Waldbusser, S., "Remote Network Monitoring MIB", RFC 1757, February 1995.
- [RFC1777] Yeong, W., Howes, T. and S. Kille, "Lightweight Directory Access Protocol", RFC 1777, March 1995.
- [RFC1782] Malkin, G. and A. Harkin, "TFTP Option Extension", RFC 1782, March 1995.
- [RFC1783] Malkin, G. and A. Harkin, "TFTP BlockOption Option", RFC 1783, March 1995.
- [RFC1784] Malkin, G. and A. Harkin, "TFTP Timeout Interval and Transfer Size Options", RFC 1784, March 1995.
- [RFC1798] Young, A., "Connection-less Lightweight Directory Access Protocol", RFC 1798, June 1995.
- [RFC1813] Callaghan, B., Pawlowski, B. and P. Staubach, "NFS Version 3 Protocol Specification", RFC 1813, June 1995.
- [RFC1819] Delgrossi, L. and L. Berger, "Internet Stream Protocol Version 2 (ST2)", RFC 1819, August 1995.
- [RFC1831] Srinivasan, R., "Remote Procedure Call Protocol Version 2", RFC 1831, August 1995.
- [RFC1853] Simpson, W., "IP in IP Tunneling", RFC 1853, October 1995.
- [RFC1901] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Introduction to Community-based SNMPv2", RFC 1901, January 1996.
- [RFC1902] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Structure of Management Information for version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1902, January 1996.
- [RFC1903] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Textual Conventions for version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1903, January 1996.

- [RFC1904] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Conformance Statements for version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1904, January 1996.
- [RFC1905] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1905, January 1996.
- [RFC1906] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Transport Mappings for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1906, January 1996.
- [RFC1940] Estrin, D., Li, T., Rekhter, Y., Varadhan, K. and D. Zappala, "Source Demand Routing: Packet Format and Forwarding Specification (Version 1)", RFC 1940, May 1996.
- [RFC1945] Berners-Lee, T. and R. Fielding, "Hypertext Transfer Protocol -- HTTP/1.0", RFC 1945, November 1995.
- [RFC2002] Perkins, C., "IP Mobility Support", RFC 2002, October 1996.
- [RFC2003] Perkins, C., "IP Encapsulation within IP", RFC 2003, October 1996.
- [RFC2021] Waldbusser, S., "Remote Network Monitoring MIB (RMON-2)", RFC 2021, January 1997.
- [RFC2037] McCloghrie, K. and A. Bierman, "Entity MIB using SMIV2", RFC 2037, October 1996.
- [RFC2068] Fielding, R., Gettys, J., Mogul, J., Frystyk, H. and T. Berners-Lee, "Hypertext Transfer Protocol -- HTTP/1.1", RFC 2068, January 1997.
- [RFC2069] Franks, J., Hallam-Baker, P., Hostetler, J., Luotonen, P. A. and E. L. Stewart, "An Extension to HTTP: Digest Access Authentication", RFC 2069, January 1997.
- [RFC2074] Bierman, A. and R. Iddon, "Remote Network Monitoring MIB Protocol Identifiers", RFC 2074, January 1997.
- [RFC2109] Kristol, D. and L. Montulli, "HTTP State Management Mechanism", RFC 2109, February 1997.



- [RFC2138] Rigney, C., Rubens, A., Simpson, W. and W. Willens, "Remote Authentication Dial In User Service (RADIUS)", RFC 2138, April 1997.
- [RFC2139] Rigney, C., "RADIUS Accounting", RFC 2139, April 1997.
- [RFC2145] Mogul, J., Fielding, R., Gettys, J. and H. Frystyk, "Use and interpretation of HTTP version numbers", RFC 2145, May 1997.
- [RFC2205] Braden, R., Zhang, L., Berson, S., Herzog, S. and S. Jamin, "Resource ReSerVation Protocol (RSVP) -- Version 1 Functional Specification", RFC 2205, September, 1997.
- [RFC2233] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB Using SMIV2", RFC 2233, November, 1997.
- [RFC2271] Harrington, D., Presuhn, R. and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", RFC 2271, January 1998.
- [RFC2272] Case, J., Harrington D., Presuhn R. and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", RFC 2272, January 1998.
- [RFC2273] Levi, D., Meyer, P. and B. Stewart, "SNMPv3 Applications", RFC 2273, January 1998.
- [RFC2274] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", RFC 2274, January 1998.
- [RFC2275] Wijnen, B., Presuhn, R. and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", RFC 2275, January 1998.
- [RFC2332] Luciani, J., Katz, D., Piscitello, D., Cole, B. and N. Doraswamy, "NBMA Next Hop Resolution Protocol (NHRP)", RFC 2332, April 1998.
- [RFC2408] Maughan, D., Schertler, M., Schneider, M. and J. Turner, RFC 2408, November 1998.
- [RFC2570] Case, J., Mundy, R., Partain, D. and B. Stewart, "Introduction to Version 3 of the Internet-standard Network Management Framework", RFC 2570, April 1999.

- [RFC2571] Harrington, D., Presuhn, R. and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", RFC 2571, April 1999.
- [RFC2572] Case, J., Harrington D., Presuhn R. and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", RFC 2572, April 1999.
- [RFC2573] Levi, D., Meyer, P. and B. Stewart, "SNMPv3 Applications", RFC 2573, April 1999.
- [RFC2574] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", RFC 2574, April 1999.
- [RFC2575] Wijnen, B., Presuhn, R. and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", RFC 2575, April 1999.
- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.
- [RFC2600] Reynolds, J. and R. Braden, "Internet Official Protocol Standards", STD 1, RFC 2600, March 2000.
- [RFC2895] Bierman, A., Bucci, C. and R. Iddon, "RMON Protocol Identifier Reference", RFC 2895, August 2000.

## 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.

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