                    Internet Official Protocol Standards

Status of this Memo

   This memo describes the state of standardization of protocols used in
   the Internet as determined by the Internet Engineering Task Force
   (IETF). This memo is an Internet Standard. Distribution of this
   memo is unlimited.

Table of Contents

1. Introduction

   This memo summarizes the status of Internet protocols and
   specifications. It is published by the RFC Editor in accordance with
   Section 2.1 of "The Internet Standards Process -- Revision 3", RFC
   2026, which specifies the rules and procedures by which all Internet
   stnadards are set. This memo is prepared by the RFC Editor for the
   IESG and IAB. It is a member of a series of summary memos that are
   published approximately every one hundred RFCs; please see
   www.rfc-editor.org.

   This memo lists the level and status of the archival documents known
   as RFCs (Request for Comments) within the Internet standards process.
   The reader is urged to review RFC 2026 for essential context for
   interpreting this memo.

   The following introductory text is quoted directly from RFC 2026:

      "The Internet, a loosely-organized international collaboration of
      autonomous, interconnected networks, supports host-to-host
      communication through voluntary adherence to open protocols and
      procedures defined by Internet Standards. There are also many
      isolated interconnected networks, which are not connected to the
      global Internet but use the Internet Standards.

      The Internet Standards Process described in this document is
      concerned with all protocols, procedures, and conventions that are
      used in or by the Internet, whether or not they are part of the
      TCP/IP protocol suite. In the case of protocols developed and/or
      standardized by non-Internet organizations, however, the Internet
      Standards Process normally applies to the application of the
      protocol or procedure in the Internet context, not to the
      specification of the protocol itself.

      In general, an Internet Standard is a specification that is stable
      and well-understood, is technically competent, has multiple,
      independent, and interoperable implementations with substantial
      operational experience, enjoys significant public support, and is
      recognizably useful in some or all parts of the Internet.

      Each distinct version of an Internet standards-related
      specification is published as part of the "Request for Comments"
      (RFC) document series. This archival series is the official
      publication channel for Internet standards documents and other
      publications of the IESG, IAB, and Internet community. RFCs can
      be obtained from a number of Internet hosts using anonymous FTP,
      gopher, World Wide Web, and other Internet document-retrieval
      systems.

The rules for formatting and submitting an RFC are defined in [5].
Every RFC is available in ASCII text. Some RFCs are also
available in other formats. The other versions of an RFC may
contain material (such as diagrams and figures) that is not
present in the ASCII version, and it may be formatted differently.

```
        ************************************************************
        *                                                          *
        *  A stricter requirement applies to standards-track       *
        *  specifications:  the ASCII text version is the          *
        *  definitive reference, and therefore it must be a        *
        *  complete and accurate specification of the standard,    *
        *  including all necessary diagrams and illustrations.     *
        *                                                          *
        ************************************************************
```

The status of Internet protocol and service specifications is
summarized periodically in an RFC entitled "Internet Official
Protocol Standards" [1]. This RFC shows the level of maturity and
other helpful information for each Internet protocol or service
specification (see section 3).

Specifications subject to the Internet Standards Process fall into
one of two categories: Technical Specification (TS) and
Applicability Statement (AS).

Some RFCs document Internet Standards. These RFCs form the "STD"
subseries of the RFC series [4]. When a specification has been
adopted as an Internet Standard, it is given the additional label
"STDxxx", but it keeps its RFC number and its place in the RFC
series. (see section 4.1.3)

Some RFCs standardize the results of community deliberations about
statements of principle or conclusions about what is the best way
to perform some operations or IETF process function. These RFCs
form the specification has been adopted as a BCP, it is given the
additional label "BCPxxx", but it keeps its RFC number and its
place in the RFC series. (see section 5)

Not all specifications of protocols or services for the Internet
should or will become Internet Standards or BCPs. Such non-
standards track specifications are not subject to the rules for
Internet standardization. Non-standards track specifications may
be published directly as "Experimental" or "Informational" RFCs at
the discretion of the RFC Editor in consultation with the IESG
(see section 4.2)."

Section 2 of this memo lists all Technical Specification RFCs that
are in the standards track, and Section 3 lists Applicability
Statement RFCs in the standards track. Section 4 lists those
protocol specification RFCs that are off the standards track
(Informational and Historic status). This memo does not list
Informational RFCs that may be of general interest to the community
but do not specify protocols for the Internet. It also does not list
BCP RFCs. Telnet options have been added into the lists.

2. Current Technical Specifications

Subsections 2.1-2.5 list the standards in groups by protocol state.
In the following lists, shorthand nicknames have been shown for many
of the major protocols. These names are commonly used in discourse
on Internet mailing lists.

2.1. Standard Protocols

```
Protocol    Name                                        RFC STD *
========    ==================================          ==== === =
--------    Internet Official Protocol Standards        2500  1
--------    Assigned Numbers                            1700  2
IP          Internet Protocol                            791  5
             as amended by:--------
--------      IP Subnet Extension                        950  5
--------      IP Broadcast Datagrams                     919  5
--------      IP Broadcast Datagrams with Subnets        922  5
ICMP        Internet Control Message Protocol            792  5
IGMP        Internet Group Multicast Protocol           1112  5
UDP         User Datagram Protocol                       768  6
TCP         Transmission Control Protocol                793  7
TELNET      Telnet Protocol                          854,855  8
FTP         File Transfer Protocol                       959  9
SMTP        Simple Mail Transfer Protocol                821 10
SMTP-SIZE   SMTP Service Ext for Message Size           1870 10
SMTP-EXT    SMTP Service Extensions                     1869 10
MAIL        Format of Electronic Mail Messages           822 11
NTPV2       Network Time Protocol (Version 2)           1119 12
DOMAIN      Domain Name System                     1034,1035 13
DNS-MX      Mail Routing and the Domain System           974 14
SNMP        Simple Network Management Protocol          1157 15
SMI         Structure of Management Information         1155 16
Concise-MIB Concise MIB Definitions                     1212 16
MIB-II      Management Information Base-II               1213 17
NETBIOS     NetBIOS Service Protocols              1001,1002 19
ECHO        Echo Protocol                                862 20
DISCARD     Discard Protocol                             863 21
CHARGEN     Character Generator Protocol                 864 22
QUOTE       Quote of the Day Protocol                    865 23
USERS       Active Users Protocol                        866 24
DAYTIME     Daytime Protocol                             867 25
TIME        Time Server Protocol                         868 26
TOPT-BIN    Binary Transmission                          856 27
TOPT-ECHO   Echo                                         857 28
TOPT-SUPP   Suppress Go Ahead                            858 29
TOPT-STAT   Status                                       859 30
TOPT-TIM    Timing Mark                                  860 31
TOPT-EXTOP  Extended-Options-List                        861 32
TFTP        Trivial File Transfer Protocol              1350 33
TP-TCP      ISO Transport Service on top of the TCP     1006 35
ETHER-MIB   Ethernet MIB                                1643 50
PPP         Point-to-Point Protocol (PPP)               1661 51
PPP-HDLC    PPP in HDLC Framing                         1662 51
IP-SMDS     IP Datagrams over the SMDS Service          1209 52
```

```
POP3       Post Office Protocol, Version 3              1939  53
OSPF2      Open Shortest Path First Routing V2          2328  54
IP-FR      Multiprotocol over Frame Relay               2427  55*
RIP2       RIP Version 2-Carrying Additional Info.      2453  56*
RIP2-APP   RIP Version 2 Protocol App. Statement        1722  57*
SMIv2      Structure of Management Information v2        2578  58*
CONV-MIB   Textual Conventions for SNMPv2               2579  58*
CONF-MIB   Conformance Statements for SNMPv2            2580  58*
```

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

2.2. Network-Specific Standard Protocols

```
Protocol   Name                                    RFC    STD *
========   ====================================    =====  === =
IP-ATM     Classical IP and ARP over ATM           2225
ATM-ENCAP  Multiprotocol Encapsulation over ATM    1483
IP-TR-MC   IP Multicast over Token-Ring LANs       1469
IP-FDDI    Transmission of IP and ARP over FDDI Net 1390    36
IP-X.25    X.25 and ISDN in the Packet Mode        1356
ARP        Address Resolution Protocol              826    37
RARP       A Reverse Address Resolution Protocol    903    38
IP-ARPA    Internet Protocol on ARPANET          BBN1822   39
IP-WB      Internet Protocol on Wideband Network    907    40
IP-E       Internet Protocol on Ethernet Networks   894    41
IP-EE      Internet Protocol on Exp. Ethernet Nets  895    42
IP-IEEE    Internet Protocol on IEEE 802           1042    43
IP-DC      Internet Protocol on DC Networks         891    44
IP-HC      Internet Protocol on Hyperchannel       1044    45
IP-ARC     Transmitting IP Traffic over ARCNET Nets 1201   46
IP-SLIP    Transmission of IP over Serial Lines    1055    47
IP-NETBIOS Transmission of IP over NETBIOS         1088    48
IP-IPX     Transmission of 802.2 over IPX Networks 1132    49
IP-HIPPI   IP over HIPPI                           2067
```

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

2.3. Draft Standard Protocols

```
Protocol    Name                                               RFC
========    ====================================               =====
VACM-SNMP   View-based Access Control Model for SMMP            2575*
USM-SNMPV3  User-based Security Model for SNMPv3                2574*
SNMP-APP    SNMP Applications                                   2573*
MPD-SNMP    Message Processing & Dispatching SNMP               2572*
ARCH-SNMP   Architecture Describing SNMP Management Frameworks  2571*
ICMPv6      ICMPv6 for IPv6                                     2463*
IPV6-AUTO   IPv6 Stateless Address Autoconfiguation             2462*
IPV6-ND     Neighbor Discovery for IP Version 6                 2461*
IPV6        IPv6 Specification                                  2460*
URI-GEN     URI: Generic Syntax                                 2396
IARP        Inverse Address Resolution Protocol                 2390
TN3270E     Telnet Option - TN3270 Enhancements                 2355*
TFTP-Opt    TFTP Options                                        2349
TFTP-Blk    TFTP Blocksize Option                               2348
TFTP-Ext    TFTP Option Extension                               2347
ONE-PASS    One-Time Password System                            2289
SMTP-Pipe   SMTP Serv. Ext. for Command Pipelining              2197
DHCP-BOOTP  DHCP Options and BOOTP Extensions                   2132
DHCP        Dynamic Host Configuration Protocol                 2131
FRAME-MIB   Management Information Base for Frame                2115
-------     Clarifications and Extensions BOOTP                 1542
DHCP-BOOTP  Interoperation Between DHCP and BOOTP               1534
BOOTP       Bootstrap Protocol                                 951,2132
MIME-CONF   MIME Conformance Criteria                           2049
MIME-MSG    MIME Msg Header Ext for Non-ASCII                   2047
MIME-MEDIA  MIME Media Types                                    2046
MIME        Multipurpose Internet Mail Extensions               2045
PPP-CHAP    PPP Challenge Handshake Authentication              1994
PPP-MP      PPP Multilink Protocol                              1990
PPP-LINK    PPP Link Quality Monitoring                         1989
COEX-MIB    Coexistence between SNMPV1 & SNMPV2                  1908
SNMPv2-MIB  MIB for SNMPv2                                      1907
TRANS-MIB   Transport Mappings for SNMPv2                       1906
OPS-MIB     Protocol Operations for SNMPv2                      1905
CON-MD5     Content-MD5 Header Field                            1864
OSPF-MIB    OSPF Version 2 MIB                                  1850
STR-REP     String Representation ...                           1779
X.500syn    X.500 String Representation ...                     1778
X.500lite   X.500 Lightweight ...                               1777
BGP-4-APP   Application of BGP-4                                1772
BGP-4       Border Gateway Protocol 4                           1771
PPP-DNCP    PPP DECnet Phase IV Control Protocol                1762
RMON-MIB    Remote Network Monitoring MIB                       1757
802.5-MIB   IEEE 802.5 Token Ring MIB                           1748
```

```
RIP2-MIB   RIP Version 2 MIB Extension                        1724
SIP-MIB    SIP Interface Type MIB                             1694
-------    Def Man Objs Parallel-printer-like                 1660
-------    Def Man Objs RS-232-like                           1659
-------    Def Man Objs Character Stream                      1658
BGP-4-MIB  BGP-4 MIB                                          1657
SMTP-8BIT  SMTP Service Ext or 8bit-MIMEtransport             1652
OSI-NSAP   Guidelines for OSI NSAP Allocation                 1629
ISO-TS-ECHO Echo for ISO-8473                                 1575
DECNET-MIB DECNET MIB                                         1559
BRIDGE-MIB BRIDGE-MIB                                         1493
NTPV3      Network Time Protocol (Version 3)                  1305
FINGER     Finger Protocol                                    1288
IP-MTU     Path MTU Discovery                                 1191
TOPT-LINE  Linemode                                           1184
NICNAME    WhoIs Protocol                                      954
```

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

2.4. Proposed Standard Protocols

```
Protocol    Name                                             RFC
========    ===================================              =====
--------    PKIX Operational Protocols: FTP and HTTP         2585*
--------    APPN/HPR in IP Networks MIB                      2584*
TCP-CC      TCP Congestion Control                           2581*
APP-MIB     Application Management MIB                        2564*
--------    DHCP Auto-Configuration Option                   2563*
--------    TN3270E-RT-MIB                                   2562*
--------    TN3270E Using SMIv2 MIB                          2561*
--------    Internet X.509 Public Key Infra. Op. Proto. LDAPv2  2559*
--------    SONET/SDH Interface Type MIB                     2558*
MHTML       MIME Encap. of Aggregate Documents, such as HTML 2557*
--------    SMTP Service Extension for Authentication        2554*
--------    Use of BGP-4 Multipro. Ext. for IPv6 IDR         2545*
SIP         Session Initiation Protocol                      2543*
DHK-DNS     Storage of Diffie-Hellman Keys in DNS            2539*
SC-DNS      Storing Certificates in the DNS                  2538*
--------    RSA/MD5 KEYs and SIGs in the DNS                 2537*
--------    DSA KEYs and SIGs in the DNS                     2536*
DNS-SECEXT  Domain Name System Security Extensions           2535*
--------    Media Features for Display, Print, Fax           2534*
--------    Transmission of IPv6 Packets over IPv4           2529*
--------    Reserved IPv6 Subnet Anycast Addresses           2526*
WEBDAV      HTTP Ext. for Distributed Authoring              2518*
ATM-MIBMAN  MIB for ATM Management                            2515*
ATM-TC-OID  ATM Textual Conventions and OIDs                 2514*
--------    Connection-Oriented Accounting MIB               2513*
--------    Accounting Information for ATM Networks           2512*
X.509-CRMF  Internet X.509 CRMF                               2511*
PKICMP      Internet X.509 PKI CMP                            2510*
IPCOM-PPP   IP Header Compression over PPP                   2509*
--------    Compressing IP/UDP/RTP Headers                   2508*
--------    IP Header Compression                             2507*
--------    IPv6 Datagrams on ARCnet                         2497*
DS3-E3-MIB  DS3/E3 Interface Type MIB                        2496*
--------    DS1/E1/DS2/E2 MIB                                2495*
--------    DSO MIB / DSOBUNDLE MIB                          2494*
--------    15 Minute Based Performance History TCs          2493*
IPv6ATMNET  IPv6 over ATM Networks                            2492*
IPv6-NBMA   IPv6 over Non-Broadcast Multiple Access          2491*
--------    SMTP Serv. Ext. for Secure SMTP over TLS         2487*
NAI         Network Access Identifier                        2486*
--------    DCHP Option for the Open Group's UAP             2485*
--------    PPP LCP Internationalization Option              2484*
--------    Gateways and MIME Security Multiparts            2480*
--------    GSS-API Negotiation Mechanism                    2478*
```

```
--------   Message Submission                                2476*
DIFFSRV    Architecture for Differentiated Service           2475*
--------   Differentiated Services Field                     2474*
--------   Generic Packet Tunneling in IPv6                  2473*
IPv6-PPP   IP Version 6 over PPP                             2472*
--------   IPv6 Packets over Token Ring Networks             2470*
--------   IPv6 Packets over FDDI Networks                   2467*
ICMPv6-MIB ICMPv6 Group MIB                                  2466*
--------   Textual Conventions, General Group MIB            2465*
--------   IPv6 Packets over Ethernet Networks               2464*
--------   Internet X.509 Public Key Infrastructure          2459*
EBN-MIB    Extended Border Node MIB                          2457*
--------   APPN TRAPS MIB                                    2456*
APPN-MIB   APPN MIB                                          2455*
--------   UDP MIB for IPv6                                  2454*
--------   TCP MIB for IPv6                                  2452*
--------   ESP CBC-Mode Cipher Algorithms                    2451*
POP3-EXT   POP3 Extension Mechanism                          2449*
IMIP       iCalendar Message-Based Interoperability          2447*
ITIP       iCalendar Message-Based Interoperability          2446*
ICALENDAR  Internet Calendaring, Scheduling Core..           2445*
OTP-SASL   OTP SASL Mechanism                                2444*
--------   OpenPGP Message Format                            2440*
--------   BGP Route Flap Damping                            2439*
--------   RTP Payload Format for JPEG-compressed Video      2435*
--------   RTP Payload Format for BT.656 Video Encoding      2431*
--------   RTP Payload Format for H.263+                     2429*
--------   FTP Extensions for IPv6 and NATs                  2428
MIME-VCARD vCard MIME Directory Profile                      2426
TXT-DIR    MIME Content-Type for Directory Info              2425
CONT-DUR   Content-Duration MIME Header                      2424
MIME-VPIM  VPIM Voice Message                                2423
MIME-ADPCM Toll Quality Voice - 32 kbit/s ADPC               2422
MIME-VP2   Voice Profile for Internet Mail V2                2421
--------   Multicast/UNI 3.0/3.1 based ATM MIB               2417
--------   NULL Encryption Algorithm and Its Use With IPsec  2410*
IKE        The Internet Key Exchange                         2409*
ISAKMP     Internet Security Association and Key Management Pro.  2408*
ISAKMPSEC  IP Security Domain of Interpretation for ISAKMP   2407*
ESP        IP Encapsulating Security Payload                 2406*
ESPDES-CBC ESP DES-CBC Cipher Algorithm With Explicit IV     2405*
--------   Use of HMAC-SHA-1-96 within ESP and AH            2404*
--------   Use of HMAC-MD5-96 within ESP and AH              2403*
IP-AUTH    IP Authentication Header                          2402*
IPSEC      Security Architecture for the Internet Protocol   2401*
DATA-URL   "data" URL scheme                                 2397
CIDMID-URL Content-ID and Message-ID URLs                    2392
IPCOMP     IP Payload Compression Protocol                   2393*
```

```
MULTI-UNI   Multicast over UNI 3.0/3.1 based ATM            2022
RMON-MIB    RMON MIB using SMIv2                            2021
802.12-MIB  IEEE 802.12 Interface MIB                       2020
IPV6-FDDI   Transmission of IPv6 Packets Over FDDI          2019
TCP-ACK     TCP Selective Acknowledgement Options           2018
URL-ACC     URL Access-Type                                 2017
MIME-PGP    MIME Security with PGP                          2015
MIB-UDP     SNMPv2 MIB for UDP                              2013
MIB-TCP     SNMPv2 MIB for TCP                              2012
MIB-IP      SNMPv2 MIB for IP                               2011
MOBILEIPMIBMobile IP MIB Definition using SMIv2            2006
MINI-IP     Minimal Encapsulation within IP                2004
IPENCAPIP   IP Encapsulation within IP                      2003
MOBILEIPSUPIP Mobility Support                             2002
TCPSLOWSRT TCP Slow Start, Congestion Avoidance...         2001
BGP-COMM    BGP Communities Attribute                       1997
DNS-NOTIFY Mech. for Notification of Zone Changes          1996
DNS-IZT     Incremental Zone Transfer in DNS               1995
SMTP-ETRN   SMTP Service Extension ETRN                     1985
SNA         Serial Number Arithmetic                        1982
MTU-IPV6    Path MTU Discovery for IP version 6            1981
PPP-FRAME   PPP in Frame Relay                              1973
IPV6-ETHER Transmission IPv6 Packets Over Ethernet         1972
PPP-ECP     PPP Encryption Control Protocol                 1968
GSSAPI-KER Kerberos Version 5 GSS-API Mechanism            1964
PPP-CCP     PPP Compression Control Protocol                1962
GSSAPI-SOC GSS-API Auth for SOCKS Version 5                1961
LDAP-STR    String Rep. of LDAP Search Filters             1960
LDAP-URL    LDAP URL Format                                 1959
TRANS-IPV6 Transition Mechanisms IPv6 Hosts/Routers        1933
AUTH-SOCKS Username Authentication for SOCKS V5            1929
SOCKSV5     SOCKS Protocol Version 5                        1928
WHOIS++M    How to Interact with a Whois++ Mesh            1914
WHOIS++A    Architecture of Whois++ Index Service          1913
DSN         Delivery Status Notifications                   1894
EMS-CODE    Enhanced Mail System Status Codes              1893
MIME-RPT    Multipart/Report                                1892
SMTP-DSN    SMTP Delivery Status Notifications             1891
RTP-AV      RTP Audio/Video Profile                         1890
RTP         Transport Protocol for Real-Time Apps          1889
DNS-IPV6    DNS Extensions to support IPv6                  1886
HTML        Hypertext Markup Language - 2.0                1866
MIME-Sec    MIME Object Security Services                  1848
MIME-Encyp MIME: Signed and Encrypted                      1847
WHOIS++     Architecture of the WHOIS++ service            1835
--------    Binding Protocols for ONC RPC Version 2        1833
XDR         External Data Representation Standard          1832
RPC         Remote Procedure Call Protocol V. 2            1831
```

```
--------   ESP DES-CBC Transform                             1829
--------   IP Authentication using Keyed MD5                 1828
ESP        IP Encapsulating Security Payload                 1827
IPV6-AH    IP Authentication Header                          1826
--------   Security Architecture for IP                      1825
R          Requirements for IP Version 4 Routers             1812
URL        Relative Uniform Resource Locators                1808
CLDAP      Connection-less LDAP                              1798
OSPF-DC    Ext. OSPF to Support Demand Circuits              1793
OSI-Dir    OSI User Friendly Naming ...                      1781
MIME-EDI   MIME Encapsulation of EDI Objects                 1767
Lang-Tag   Tags for Identification of Languages              1766
XNSCP      PPP XNS IDP Control Protocol                      1764
BVCP       PPP Banyan Vines Control Protocol                 1763
Print-MIB  Printer MIB                                       1759
ATM-SIG    ATM Signaling Support for IP over ATM             1755
IPNG       Recommendation for IP Next Generation             1752
802.5-SSR  802.5 SSR MIB using SMIv2                         1749
SDLCSMIv2  SNADLC SDLC MIB using SMIv2                       1747
BGP4/IDRP  BGP4/IDRP for IP/OSPF Interaction                 1745
AT-MIB     Appletalk MIB                                     1742
MacMIME    MIME Encapsulation of Macintosh files            1740
URL        Uniform Resource Locators                        1738
POP3-AUTH  POP3 AUTHentication command                       1734
IMAP4-AUTH IMAP4 Authentication Mechanisms                   1731
RDBMS-MIB  RDMS MIB - using SMIv2                            1697
MODEM-MIB  Modem MIB - using SMIv2                           1696
ATM-MIB    ATM Management Version 8.0 using SMIv2            1695
TMUX       Transport Multiplexing Protocol                   1692
SNANAU-MIB SNA NAUs MIB using SMIv2                          1666
PPP-TRANS  PPP Reliable Transmission                         1663
--------   Postmaster Convention X.400 Operations            1648
PPP-BCP    PPP Bridging Control Protocol                     1638
UPS-MIB    UPS Management Information Base                    1628
PPP-SONET  PPP over SONET/SDH                                1619
PPP-ISDN   PPP over ISDN                                     1618
DNS-R-MIB  DNS Resolver MIB Extensions                       1612
DNS-S-MIB  DNS Server MIB Extensions                         1611
FR-MIB     Frame Relay Service MIB                           1604
PPP-X25    PPP in X.25                                       1598
OSPF-NSSA  The OSPF NSSA Option                              1587
OSPF-Multi Multicast Extensions to OSPF                      1584
SONET-MIB  MIB SONET/SDH Interface Type                      1595
RIP-DC     Extensions to RIP to Support Demand Cir.          1582
--------   Evolution of the Interfaces Group of MIB-II Elective 1573
TOPT-ENVIR Telnet Environment Option                         1572
PPP-LCP    PPP LCP Extensions                                1570
X500-MIB   X.500 Directory Monitoring MIB                    1567
```

```
TCP-EXT     TCP Extensions for High Performance                 1323
NETFAX      File Format for the Exchange of Images              1314
FDDI-MIB    FDDI-MIB                                            1285
-------     Encoding Network Addresses                          1277
-------     Replication and Distributed Operations             1276
-------     COSINE and Internet X.500 Schema                   1274
BGP-MIB     Border Gateway Protocol MIB (Version 3)            1269
ICMP-ROUT   ICMP Router Discovery Messages                     1256
OSI-UDP     OSI TS on UDP                                       1240
STD-MIBs    Reassignment of Exp MIBs to Std MIBs               1239
IPX-IP      Tunneling IPX Traffic through IP Nets              1234
IS-IS       OSI IS-IS for TCP/IP Dual Environments             1195
IP-CMPRS    Compressing TCP/IP Headers                         1144
TOPT-XDL    X Display Location                                  1096
TOPT-TERM   Terminal Type                                       1091
TOPT-TS     Terminal Speed                                      1079
TOPT-NAWS   Negotiate About Window Size                         1073
TOPT-X.3    X.3 PAD                                             1053
TOPT-DATA   Data Entry Terminal                                 1043
TOPT-3270   Telnet 3270 Regime                                  1041
NNTP        Network News Transfer Protocol                       977
TOPT-TLN    Terminal Location Number                             946
TOPT-OM     Output Marking                                       933
TOPT-TACACS  TACACS User Identification                          927
TOPT-EOR    End of Record                                        885
TOPT-SNDL   Send Location                                        779
TOPT-SUPO   SUPDUP Output                                        749
TOPT-SUP    SUPDUP                                               736
TOPT-BYTE   Byte Macro                                           735
TOPT-REM    Remote Controlled Trans and Echo                    726
TOPT-LOGO   Logout                                               727
TOPT-EXT    Extended ASCII                                       698
```

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

2.5. Experimental Protocols

```
Protocol    Name                                              RFC
========    ===================================               =====
-------     NewReno Modification to TCP's Fast Recovery Algorithm  2582*
-------     Mapping between LPD and IPP Protocols             2569*
IPP-RAT     Rationale for the Structure of IPP                2568*
IPP-DG      Design Goals for an Internet Printing Protocol    2567*
IPP-M-S     Internet Printing Protocol/1.0: Model and Semantics  2566*
IPP-E-T     Internet Printing Protocol/1.0: Encoding and Transport  2565*
DNS-INFO    Detached Domain Name System (DNS) Information     2540*
PHOTURIS-E  Photuris: Extended Schemes and Attributes         2523*
PHOTURIS-S  Photuris: Session-Key Management Protocol          2522*
ICMP-SEC    ICMP Security Failures Messages                   2521*
NHRP-MNHCS  NHRP with Mobile NHCs                             2520*
IPPM-MET    IPPM Metrics for Measuring Connectivity            2498*
-------     URI Resolution Services                           2483*
ECN-IP      Explicit Congestion Notification (ECN) to IP      2481*
-------     IPv6 Testing Address Allocation                   2471*
TCP-WIN     Increasing TCP's Initial Window                   2414
PIM-SM      Protocol Independent Multicast-Sparse Mode        2362
-------     Domain Names and Company Name Retrieva            2345
RTP-MPEG    RTP Payload Format for Bundled MPEG               2343
-------     Intra-LIS IP Multicast/Routers over ATM using PIM 2337
-------     Safe Response Header Field                        2310
LDAP-NIS    Approach Using LDAP as a Network Information Service  2307
HTTP-RVSA   HTTP Remote Variant Selection Algorithm           2296
TCN-HTTP    Transparent Content Negotiation in HTTP           2295
TOPT-COMPORT Telnet Com Port Control                          2217
-------     Core Based Trees (CBT) Multicast Routing Architecture  2201
-------     Core Based Trees (CBT version 2) Multicast Routing  2189
-------     Trivial Convention using HTTP in URN Resolution   2169
-------     Resolution of URIs using DNS                      2168
MAP-MAIL    X.400 Mapping and Mail-11                         2162
MIME-ODA    A MIME Body Part for ODA                          2161
OSPF-DIG    OSPF with Digital Signature                       2154
GKMP-ARCH   Group Key Management Protocol (GKMP) Architecture 2094
GKMP-SPEC   Group Key Management Protocol (GKMP) Specification 2093
TOPT-CHARSET Telnet CHARSET                                   2066
IP-SCSI     Encapsulating IP with the SCSI                    2143
X.500-NAME  Managing the X.500 Root Naming Context            2120
TFTP-MULTI  TFTP Multicast Option                             2090
IP-Echo     IP Echo Host Service                              2075
METER-MIB   Traffic Flow Measurement Meter MIB                2064
TFM-ARCH    Traffic Flow Measurement Architecture             2063
DNS-SRV     Location of Services in the DNS                   2052
URAS        Uniform Resource Agents                           2016
GPS-AR      GPS-Based Addressing and Routing                  2009
```

```
ETFTP       Enhanced Trivial File Transfer Protocol           1986
BGP-RR      BGP Route Reflection                              1966
BGP-ASC     Autonomous System Confederations for BGP          1965
SMKD        Scalable Multicast Key Distribution               1949
HTML-TBL    HTML Tables                                       1942
SNMPV2SM    User-based Security Model for SNMPv2              1910
SNMPV2AI    SNMPv2 Administrative Infrastructure              1909
SNMPV2CB    Introduction to Community-based SNMPv2            1901
-------     IPv6 Testing Address Allocation                  1897
DNS-LOC     Location Information in the DNS                   1876
SGML-MT     SGML Media Types                                  1874
CONT-MT     Access Type Content-ID                           1873
UNARP       ARP Extension - UNARP                             1868
-------     Form-based File Upload in HTML                    1867
-------     BGP/IDRP Route Server Alternative                1863
-------     IP Authentication using Keyed SHA                 1852
ESP3DES     ESP Triple DES Transform                          1851
-------     SMTP 521 Reply Code                              1846
-------     SMTP Serv. Ext. for Checkpoint/Restart           1845
-------     SMTP Serv. Ext. Large and Binary MIME Msgs.      1830
ST2         Stream Protocol Version 2                         1819
-------     Content-Disposition Header                       1806
-------     Schema Publishing in X.500 Directory             1804
-------     X.400-MHS use X.500 to support X.400-MHS Routing 1801
-------     Class A Subnet Experiment                        1797
TCP/IPXMIB  TCP/IPX Connection Mib Specification             1792
-------     TCP And UDP Over IPX Networks With Fixed Path MTU 1791
ICMP-DM     ICMP Domain Name Messages                         1788
CLNP-MULT   Host Group Extensions for CLNP Multicasting       1768
OSPF-OVFL   OSPF Database Overflow                            1765
RWP         Remote Write ProtocolL - Version 1.0              1756
NARP        NBMA Address Resolution Protocol                  1735
DNS-ENCODE  DNS Encoding of Geographical Location             1712
TCP-POS     An Extension to TCP: Partial Order Service        1693
T/TCP       TCP Extensions for Transactions                   1644
MIME-UNI    Using Unicode with MIME                           1641
FOOBAR      FTP Operation Over Big Address Records            1639
X500-CHART  Charting Networks in the X.500 Directory          1609
X500-DIR    Representing IP Information in the X.500 Directory 1608
SNMP-DPI    SNMP Distributed Protocol Interface               1592
CLNP-TUBA   Use of ISO CLNP in TUBA Environments              1561
REM-PRINT   TPC.INT Subdomain Remote Printing - Technical     1528
EHF-MAIL    Encoding Header Field for Internet Messages       1505
RAP         Internet Route Access Protocol                    1476
TP/IX       TP/IX: The Next Internet                          1475
X400        Routing Coordination for X.400 Services           1465
DNS         Storing Arbitrary Attributes in DNS               1464
IRCP        Internet Relay Chat Protocol                      1459
```

```
   TOS-LS     Link Security TOS                                1455
   SIFT/UFT   Sender-Initiated/Unsolicited File Transfer       1440
   DIR-ARP    Directed ARP                                     1433
   TOPT-AUTH  Telnet Authentication Option                     1416
   TEL-SPX    Telnet Authentication: SPX                       1412
   TEL-KER    Telnet Authentication: Kerberos V4               1411
   TRACE-IP   Traceroute Using an IP Option                    1393
   DNS-IP     Experiment in DNS Based IP Routing               1383
   RMCP       Remote Mail Checking Protocol                    1339
   TCP-HIPER  TCP Extensions for High Performance              1323
   MSP2       Message Send Protocol 2                          1312
   DSLCP      Dynamically Switched Link Control                1307
   --------   X.500 and Domains                                1279
   IN-ENCAP   Internet Encapsulation Protocol                  1241
   CLNS-MIB   CLNS-MIB                                         1238
   CFDP       Coherent File Distribution Protocol              1235
   IP-AX.25   IP Encapsulation of AX.25 Frames                 1226
   ALERTS     Managing Asynchronously Generated Alerts         1224
   MPP        Message Posting Protocol                         1204
   SNMP-BULK  Bulk Table Retrieval with the SNMP               1187
   DNS-RR     New DNS RR Definitions                           1183
   IMAP2      Interactive Mail Access Protocol                 1176
   NTP-OSI    NTP over OSI Remote Operations                   1165
   DMF-MAIL   Digest Message Format for Mail                   1153
   RDP        Reliable Data Protocol                       908,1151
   TCP-ACO    TCP Alternate Checksum Option                    1146
   IP-DVMRP   IP Distance Vector Multicast Routing             1075
   VMTP       Versatile Message Transaction Protocol           1045
   COOKIE-JAR Authentication Scheme                            1004
   NETBLT     Bulk Data Transfer Protocol                       998
   IRTP       Internet Reliable Transaction Protocol            938
   LDP        Loader Debugger Protocol                          909
   RLP        Resource Location Protocol                        887
   NVP-II     Network Voice Protocol                        ISI-memo
   PVP        Packet Video Protocol                         ISI-memo
```

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

3. Current Applicability Statements

      RFC1122 - Requirements for Internet hosts - communication layers
                (STD 3)
      RFC1123 - Requirements for Internet hosts - application and support
                (STD 3)
      RFC1370 - Applicability Statement for OSPF
      RFC1517 - Applicability Statement for the Implementation of Classless
                Inter-Domain Routing (CIDR)
      RFC1722 - RIP Version 2 Protocol Applicability Statement
      RFC1923 - RIPv1 Applicability Statement for Historic Status
      RFC2005 - Applicability Statement for IP Mobility Support
      RFC2039 - Applicability of Standards Track MIBs to Management of
                World Wide Web Servers
      RFC2081 - RIPng Protocol Applicability Statement
      RFC2208 - Resource ReSerVation Protocol (RSVP) -- Version 1
                Applicability Statement - Some Guidelines on Deployment
      RFC2333 - NHRP Protocol Applicability Statement
      RFC2556 - OSI connectionless transport services on top of UDP
                Applicability Statement for Historic Status

4. Non-Standard Protocols

4.1. Informational Protocols

Please note that there are informational RFCs that do not specify
protocols and are not listed here.

```
Protocol    Name                                          RFC
=======     ===================================           =====
AUDIO/L16   Audio/L16 MIME content type                   2586*
FTP-SEC     FTP Security Considerations                   2577*
--------    6Bone Routing Practice                        2546*
DNS-SOC     DNS Security Operational Considerations       2541*
--------    Internet X.509 Public Key Infrastructure KEA  2528*
--------    Internet X.509 Public Key Infrastructure CP & CPF  2527*
--------    Known TCP Implementation Problems             2525*
EMSD        Neda's Efficient Mail Submission and Delivery Protocol  2524*
IDRA        Framework for Inter-Domain Route Aggregation  2519*
PPPOE       Method for Transmitting PPP Over Ethernet     2516*
--------    MIME Types for Use with the ISO ILL Protocol  2503*
MANET       Mobile Ad hoc Networking Performance Issues   2501*
--------    ST2+ over ATM Protocol Spec - UNI 3.1 Version 2383
--------    Mapping Airline Reservation, Ticketing, Messaging  2351
KOI8-U      Ukrainian Character Set KOI8-U                2319
TEXT-CSS    The text/css Media Type                       2318
PKCS-7      PKCS #7: Cryptographic Message Syntax Version 1.5  2315
PKCS-10     PKCS #10: Certification Request Syntax Version 1.5  2314
PKCS-1      PKCS #1: RSA Encryption Version 1.5           2313
SMIME-CERT  S/MIME Version 2 Certificate Handling         2312
SMIME-MSG   S/MIME Version 2 Message Specification        2311
TIFF        Tag Image File Format F Profile for Facsimile 2302
GSMP        Ipsilon's General Switch Management Protocol  2297
HSRP        Cisco Hot Standby Router Protocol (HSRP)      2281
RC2-ENCRP   A Description of the RC2(r) Encryption Algorithm  2268
SNQP        Simple Nomenclator Query Protocol             2259
--------    Japanese Character Encoding for Internet Messages  2237
KEYX-DNS    Key Exchange Delegation Record for the DNS    2230
DSP         A Dictionary Server Protocol                  2229
NFS-URL     NFS URL Scheme                                2224
APP-MARC    The Application/MARC Content-type             2220
ODETTE-FTP  ODETTE File Transfer Protocol                 2204
ESRO        AT&T/Neda's Efficient Short Remote Operations Protocol  2188
ICP         Internet Cache Protocol Version 2             2186
IPV4-MAPOS  IPv4 over MAPOS Version 1                     2176
MAPOS-SONET Multiple Access Protocol over SONET/SDH Version 1  2171
RWHOIS      Referral Whois Protocol                       2167
PPP-EXT     PPP Vendor Extensions                         2153
UTF-7       UTF-7                                         2152
```

```
CAST-128   CAST-128 Encryption Algorithm                      2144
RADIUS-ACC RADIUS Accounting                                  2139
DLSCAP     Data Link Switching Client Access Protocol         2114
PNG        Portable Network Graphics Version 1.0              2083
RC5        RC5, RC5-CBC, RC5-CBC-Pad, and RC5-CTS Algorithms  2040
SNTP       Simple Network Time Protocol v4 for IPv4, IPv6 and OSI  2030
PGP-MEF    PGP Message Exchange Formats                       1991
PPP-DEFL   PPP Deflate Protocol                               1979
PPP-PRED   PPP Predictor Compression Protocol                 1978
PPP-BSD    PPP BSD Compression Protocol                       1977
PPP-DCE    PPP for Data Compression in DCE                    1976
PPP-MAG    PPP Magnalink Variable Resource Compression        1975
PPP-STAC   PPP Stac LZS Compression Protocol                  1974
GZIP       GZIP File Format Specification Version 4.3         1952
DEFLATE    DEFLATE Compressed Data Format Specification V. 1.3  1951
ZLIB       ZLIB Compressed Data Format Specification V. 3.3   1950
HTTP-1.0   Hypertext Transfer Protocol -- HTTP/1.0            1945
--------   text/enriched MIME Content-type                    1896
--------   Application/CALS-1840 Content-type                 1895
--------   PPP IPCP Extensions for Name Server Addresses      1877
SNPP       Simple Network Paging Protocol - Version 2         1861
--------   ISO Transport Class 2 Non-use Explicit Flow Control  1859
           over TCP RFC1006 extension
--------   IP in IP Tunneling                                 1853
--------   PPP Network Control Protocol for LAN Extension     1841
TESS       The Exponential Security System                    1824
NFSV3      NFS Version 3 Protocol Specification               1813
--------   A Format for Bibliographic Records                 1807
-------    Data Link Switching: Switch-to-Switch Protocol     1795
BGP-4      Experience with the BGP-4 Protocol                 1773
SDMD       IPv4 Option for Sender Directed MD Delivery        1770
SNOOP      Snoop Version 2 Packet Capture File Format         1761
BINHEX     MIME Content Type for BinHex Encoded Files         1741
DNS-NSAP   DNS NSAP Resource Records                          1706
RADIO-PAGE TPC.INT Subdomain: Radio Paging -- Technical Procedures 1703
GRE-IPv4   Generic Routing Encapsulation over IPv4            1702
GRE        Generic Routing Encapsulatio                       1701
ADSNA-IP   Advanced SNA/IP: A Simple SNA Transport Protocol   1538
TACACS     Terminal Access Control Protocol                   1492
MD4        MD4 Message Digest Algorithm                       1320
SUN-NFS    Network File System Protocol                       1094
SUN-RPC    Remote Procedure Call Protocol Version 2           1057
GOPHER     The Internet Gopher Protocol                       1436
LISTSERV   Listserv Distribute Protocol                       1429
-------    Replication Requirements                           1275
PCMAIL     Pcmail Transport Protocol                          1056
MTP        Multicast Transport Protocol                       1301
BSD Login  BSD Login                                          1282
```

```
DIXIE      DIXIE Protocol Specification                   1249
IP-X.121   IP to X.121 Address Mapping for DDN            1236
OSI-HYPER  OSI and LLC1 on HYPERchannel                   1223
HAP2       Host Access Protocol                           1221
SUBNETASGN On the Assignment of Subnet Numbers            1219
SNMP-TRAPS Defining Traps for use with SNMP               1215
DAS        Directory Assistance Service                   1202
LPDP       Line Printer Daemon Protocol                   1179
```

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

4.2. Historic Protocols

```
Protocol   Name                                    RFC   STD
========   ====================================    =====  ===
CONTENT    Content Type Header Field               1049  11 *
IPV6-UNI   IPv6 Provider-Based Unicast Address     2073
IPV6-Addr  IPv6 Addressing Architecture            1884
L2F        Cisco Layer Two Forwarding Protocol     2341
IPSO       DoD Security Options for IP             1108
SNMPv2     Manager-to-Manager MIB                  1451
SNMPv2     Party MIB for SNMPv2                     1447
SNMPv2     Security Protocols for SNMPv2           1446
SNMPv2     Administrative Model for SNMPv2         1445
RIP        Routing Information Protocol            1058  34
--------   Mapping full 822 to Restricted 822      1137
BGP3       Border Gateway Protocol 3 (BGP-3)       1267,1268
--------   Gateway Requirements                    1009   4
EGP        Exterior Gateway Protocol                904  18
SNMP-MUX   SNMP MUX Protocol and MIB               1227
OIM-MIB-II OSI Internet Management: MIB-II         1214
IMAP3      Interactive Mail Access Protocol Version 3  1203
SUN-RPC    Remote Procedure Call Protocol Version 1    1050
802.4-MIP  IEEE 802.4 Token Bus MIB                1230
CMOT       Common Management Information Services  1189
--------   Mail Privacy: Procedures                1113
--------   Mail Privacy: Key Management             1114
--------   Mail Privacy: Algorithms                1115
NFILE      A File Access Protocol                  1037
HOSTNAME   HOSTNAME Protocol                        953
SFTP       Simple File Transfer Protocol            913
SUPDUP     SUPDUP Protocol                          734
BGP        Border Gateway Protocol                 1163,1164
MIB-I      MIB-I                                   1156
TOPT-ENVIR Telnet Environment Option               1408
SGMP       Simple Gateway Monitoring Protocol      1028
HEMS       High Level Entity Management Protocol   1021
```

```
STATSRV      Statistics Server                          996
POP2         Post Office Protocol, Version 2            937
RATP         Reliable Asynchronous Transfer Protocol    916
HFEP         Host - Front End Protocol                  929
THINWIRE     Thinwire Protocol                          914
HMP          Host Monitoring Protocol                   869
GGP          Gateway Gateway Protocol                   823
RTELNET      Remote Telnet Service                      818
CLOCK        DCNET Time Server Protocol                 778
MPM          Internet Message Protocol                  759
NETRJS       Remote Job Service                         740
TOPT-OLD     Output Linefeed Disposition                658
TOPT-OVTD    Output Vertical Tab Disposition            657
TOPT-OVT     Output Vertical Tabstops                   656
TOPT-OFD     Output Formfeed Disposition                655
TOPT-OHTD    Output Horizontal Tab Disposition          654
TOPT-OHT     Output Horizontal Tabstops                 653
TOPT-OCRD    Output Carriage-Return Disposition         652
NETED        Network Standard Text Editor               569
RJE          Remote Job Entry                           407
XNET         Cross Net Debugger                     IEN-158
NAMESERVER Host Name Server Protocol                IEN-116
MUX          Multiplexing Protocol                   IEN-90
GRAPHICS     Graphics Protocol                    NIC-24308
```

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

5. Contacts

5.1. IAB, IETF, and IRTF Contacts

   Internet Architecture Board (IAB) Contact: www.iab.org

   Internet Engineering Task Force (IETF) Contact: www.ietf.org

   Internet Research Task Force (IRTF) Contact: www.irtf.org

5.2. Internet Assigned Numbers Authority Contact

   See: www.iana.org

   How to obtain the most recent edition of this "Internet Official
   Protocol Standards" memo:

      The file "in-notes/std/std1.txt" may be copied via FTP from the
      FTP.ISI.EDU computer using the FTP username "anonymous" and FTP
      password "guest".

5.3. Request for Comments Editor Contact

      See: www.rfc-editor.org

   Documents may be submitted via electronic mail to the RFC Editor for
   consideration for publication as RFC. If you are not familiar with
   the format or style requirements please request the "Instructions for
   RFC Authors". In general, the style of any recent RFC may be used as
   a guide.

5.4. Requests for Comments Distribution Contact

   RFCs can be obtained via FTP from FTP.ISI.EDU, with the pathname in-
   notes/rfcnnnn.txt (where "nnnn" refers to the number of the RFC).
   Login with FTP username "anonymous" and password "name@host.domain".

   RFCs can also be obtained via electronic mail from ISI.EDU by using
   the RFC-INFO service. Address the request to "rfc-info@isi.edu" with
   a message body of:

           Retrieve: RFC
              Doc-ID: RFCnnnn

   (Where "nnnn" refers to the number of the RFC (always use 4 digits -
   the DOC-ID of RFC 822 is "RFC0822")). The RFC-INFO@ISI.EDU server
   provides other ways of selecting RFCs based on keywords and such; for
   more information send a message to "rfc-info@isi.edu" with the
   message body "help: help".

   contact: RFC-Manager@ISI.EDU

5.5. Sources for Requests for Comments

   Details on many sources of RFCs via FTP or EMAIL may be obtained by
   sending an EMAIL message to "rfc-info@ISI.EDU" with the message body
   "help: ways_to_get_rfcs". For example:

           To: rfc-info@ISI.EDU
           Subject: getting rfcs

           help: ways_to_get_rfcs

6. Security Considerations

   This memo does not affect the technical security of the Internet, but
   it does cite a number of important security specifications.

7. Editors' Addresses

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