Network Working Group
Request for Comments: 1700
STD: 2
Obsoletes RFCs: 1340, 1060, 1010, 990, 960,
943, 923, 900, 870, 820, 790, 776, 770,
762, 758,755, 750, 739, 604, 503, 433, 349
Obsoletes IENs: 127, 117, 93
Category: Standards Track

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ASSIGNED NUMBERS

Status of this Memo

This memo is a status report on the parameters (i.e., numbers and keywords) used in protocols in the Internet community. Distribution of this memo is unlimited.

OVERVIEW

This RFC is a snapshot of the ongoing process of the assignment of protocol parameters for the Internet protocol suite. To make the current information readily available the assignments are kept up-to-date in a set of online text files. This RFC has been assembled by catinating these files together with a minimum of formatting "glue". The authors appologize for the somewhat rougher formatting and style than is typical of most RFCs.

We expect that various readers will notice specific items that should be corrected. Please send any specific corrections via email to <iana@isi.edu>.

INTRODUCTION

The files in this directory document the currently assigned values for several series of numbers used in network protocol implementations.

ftp://ftp.isi.edu/in-notes/iana/assignments

The Internet Assigned Numbers Authority (IANA) is the central coordinator for the assignment of unique parameter values for Internet protocols. The IANA is chartered by the Internet Society (ISOC) and the Federal Network Council (FNC) to act as the clearinghouse to assign and coordinate the use of numerous Internet protocol parameters.

The Internet protocol suite, as defined by the Internet Engineering Task Force (IETF) and its steering group (the IESG), contains numerous parameters, such as internet addresses, domain names, autonomous system numbers (used in some routing protocols), protocol numbers, port numbers, management information base object identifiers, including private enterprise numbers, and many others.

The common use of the Internet protocols by the Internet community requires that the particular values used in these parameter fields be assigned uniquely. It is the task of the IANA to make those unique assignments as requested and to maintain a registry of the currently assigned values.

Requests for parameter assignments (protocols, ports, etc.) should be sent to <iana@isi.edu>.

Requests for SNMP network management private enterprise number assignments should be sent to <iana-mib@isi.edu>.

The IANA is located at and operated by the Information Sciences Institute (ISI) of the University of Southern California (USC).

If you are developing a protocol or application that will require the use of a link, socket, port, protocol, etc., please contact the IANA to receive a number assignment.

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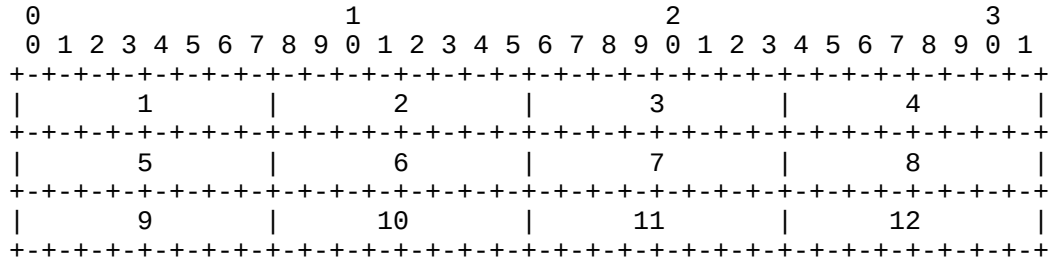
Most of the protocols are documented in the RFC series of notes. Some of the items listed are undocumented. Further information on protocols can be found in the memo, "Internet Official Protocol Standards" (STD 1).

Data Notations

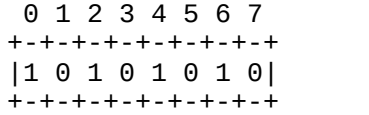
The convention in the documentation of Internet Protocols is to express numbers in decimal and to picture data in "big-endian" order [COHEN]. That is, fields are described left to right, with the most significant octet on the left and the least significant octet on the right.

The order of transmission of the header and data described in this document is resolved to the octet level. Whenever a diagram shows a group of octets, the order of transmission of those octets is the normal order in which they are read in English. For example, in the following diagram the octets are transmitted in the order they are numbered.



Transmission Order of Bytes

Whenever an octet represents a numeric quantity the left most bit in the diagram is the high order or most significant bit. That is, the bit labeled 0 is the most significant bit. For example, the following diagram represents the value 170 (decimal).



Significance of Bits

Similarly, whenever a multi-octet field represents a numeric quantity the left most bit of the whole field is the most significant bit. When

a multi-octet quantity is transmitted the most significant octet is transmitted first.

Special Addresses

There are five classes of IP addresses: Class A through Class E. Of these, Classes A, B, and C are used for unicast addresses, Class D is used for multicast addresses, and Class E addresses are reserved for future use.

With the advent of classless addressing [CIDR1, CIDR2], the network-number part of an address may be of any length, and the whole notion of address classes becomes less important.

There are certain special cases for IP addresses. These special cases can be concisely summarized using the earlier notation for an IP address:

```
IP-address ::=  { <Network-number>, <Host-number> }

   or

IP-address ::=  { <Network-number>, <Subnet-number>,
                                                <Host-number> }
```

if we also use the notation "-1" to mean the field contains all 1 bits. Some common special cases are as follows:

(a) {0, 0}

This host on this network. Can only be used as a source address (see note later).

(b) {0, <Host-number>}

Specified host on this network. Can only be used as a source address.

(c) { -1, -1}

Limited broadcast. Can only be used as a destination address, and a datagram with this address must never be forwarded outside the (sub-)net of the source.

(d) {<Network-number>, -1}

Directed broadcast to specified network. Can only be used as a destination address.

(e) {<Network-number>, <Subnet-number>, -1}

Directed broadcast to specified subnet. Can only be used as a destination address.

(f) {<Network-number>, -1, -1}

Directed broadcast to all subnets of specified subnetted network. Can only be used as a destination address.

(g) {127, <any>}

Internal host loopback address. Should never appear outside a host.

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/introduction

VERSION NUMBERS

In the Internet Protocol (IP) [RFC791] there is a field to identify the version of the internetwork general protocol. This field is 4 bits in size.

Assigned Internet Version Numbers

Decimal	Keyword	Version	References
0		Reserved	[JBP]
1-3		Unassigned	[JBP]
4	IP	Internet Protocol	[RFC791,JBP]
5	ST	ST Datagram Mode	[RFC1190,JWF]
6	SIP	Simple Internet Protocol	[RH6]
7	TP/IX	TP/IX: The Next Internet	[RXU]
8	PIP	The P Internet Protocol	[PXF]
9	TUBA	TUBA	[RXC]
10-14		Unassigned	[JBP]
15		Reserved	[JBP]

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[RXC] Ross Callon <callon@wellfleet.com>

[]

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PROTOCOL NUMBERS

In the Internet Protocol (IP) [DDN], [RFC791] there is a field, called Protocol, to identify the next level protocol. This is an 8 bit field.

Assigned Internet Protocol Numbers

Decimal	Keyword	Protocol	References
0		Reserved	[JBP]
1	ICMP	Internet Control Message	[RFC792,JBP]
2	IGMP	Internet Group Management	[RFC1112,JBP]
3	GGP	Gateway-to-Gateway	[RFC823,MB]
4	IP	IP in IP (encasulation)	[JBP]
5	ST	Stream	[RFC1190,IEN119,JWF]
6	TCP	Transmission Control	[RFC793,JBP]
7	UCL	UCL	[PK]
8	EGP	Exterior Gateway Protocol	[RFC888,DLM1]
9	IGP	any private interior gateway	[JBP]
10	BBN-RCC-MON	BBN RCC Monitoring	[SGC]
11	NVP-II	Network Voice Protocol	[RFC741,SC3]
12	PUP	PUP	[PUP,XEROX]
13	ARGUS	ARGUS	[RWS4]
14	EMCON	EMCON	[BN7]
15	XNET	Cross Net Debugger	[IEN158,JFH2]
16	CHAOS	Chaos	[NC3]
17	UDP	User Datagram	[RFC768,JBP]
18	MUX	Multiplexing	[IEN90,JBP]
19	DCN-MEAS	DCN Measurement Subsystems	[DLM1]
20	HMP	Host Monitoring	[RFC869,RH6]
21	PRM	Packet Radio Measurement	[ZSU]
22	XNS-IDP	XEROX NS IDP	[ETHERNET,XEROX]
23	TRUNK-1	Trunk-1	[BWB6]
24	TRUNK-2	Trunk-2	[BWB6]
25	LEAF-1	Leaf-1	[BWB6]
26	LEAF-2	Leaf-2	[BWB6]
27	RDP	Reliable Data Protocol	[RFC908,RH6]
28	IRTP	Internet Reliable Transaction	[RFC938,TXM]
29	ISO-TP4	ISO Transport Protocol Class 4	[RFC905,RC77]
30	NETBLT	Bulk Data Transfer Protocol	[RFC969,DDC1]
31	MFE-NSP	MFE Network Services Protocol	[MFENET,BCH2]
32	MERIT-INP	MERIT Internodal Protocol	[HWB]
33	SEP	Sequential Exchange Protocol	[JC120]
34	3PC	Third Party Connect Protocol	[SAF3]
35	IDPR	Inter-Domain Policy Routing Protocol	[MXS1]

36	XTP	XTP	[GXC]
37	DDP	Datagram Delivery Protocol	[WXC]
38	IDPR-CMTP	IDPR Control Message Transport Proto	[MXS1]
39	TP++	TP++ Transport Protocol	[DXF]
40	IL	IL Transport Protocol	[DXP2]
41	SIP	Simple Internet Protocol	[SXD]
42	SDRP	Source Demand Routing Protocol	[DXE1]
43	SIP-SR	SIP Source Route	[SXD]
44	SIP-FRAG	SIP Fragment	[SXD]
45	IDRP	Inter-Domain Routing Protocol	[Sue Hares]
46	RSVP	Reservation Protocol	[Bob Braden]
47	GRE	General Routing Encapsulation	[Tony Li]
48	MHRP	Mobile Host Routing Protocol	[David Johnson]
49	BNA	BNA	[Gary Salamon]
50	SIPP-ESP	SIPP Encap Security Payload	[Steve Deering]
51	SIPP-AH	SIPP Authentication Header	[Steve Deering]
52	I-NLSP	Integrated Net Layer Security TUBA	[GLENN]
53	SWIPE	IP with Encryption	[JI6]
54	NHRP	NBMA Next Hop Resolution Protocol	
55-60		Unassigned	[JBP]
61		any host internal protocol	[JBP]
62	CFTP	CFTP	[CFTP,HCF2]
63		any local network	[JBP]
64	SAT-EXPAK	SATNET and Backroom EXPAK	[SHB]
65	KRYPTOLAN	Kryptolan	[PXL1]
66	RVD	MIT Remote Virtual Disk Protocol	[MBG]
67	IPPC	Internet Pluribus Packet Core	[SHB]
68		any distributed file system	[JBP]
69	SAT-MON	SATNET Monitoring	[SHB]
70	VISA	VISA Protocol	[GXT1]
71	IPCV	Internet Packet Core Utility	[SHB]
72	CPNX	Computer Protocol Network Executive	[DXM2]
73	CPHB	Computer Protocol Heart Beat	[DXM2]
74	WSN	Wang Span Network	[VXD]
75	PVP	Packet Video Protocol	[SC3]
76	BR-SAT-MON	Backroom SATNET Monitoring	[SHB]
77	SUN-ND	SUN ND PROTOCOL-Temporary	[WM3]
78	WB-MON	WIDEBAND Monitoring	[SHB]
79	WB-EXPAK	WIDEBAND EXPAK	[SHB]
80	ISO-IP	ISO Internet Protocol	[MTR]
81	VMTP	VMTP	[DRC3]
82	SECURE-VMTP	SECURE-VMTP	[DRC3]
83	VINES	VINES	[BXH]
84	TTP	TTP	[JXS]
85	NSFNET-IGP	NSFNET-IGP	[HWB]
86	DGP	Dissimilar Gateway Protocol	[DGP,ML109]
87	TCF	TCF	[GAL5]
88	IGRP	IGRP	[CISCO,GXS]

89	OSPFIGP	OSPFIGP	[RFC1583,JTM4]
90	Sprite-RPC	Sprite RPC Protocol	[SPRITE,BXW]
91	LARP	Locus Address Resolution Protocol	[BXH]
92	MTP	Multicast Transport Protocol	[SXA]
93	AX.25	AX.25 Frames	[BK29]
94	IPIP	IP-within-IP Encapsulation Protocol	[JI6]
95	MICP	Mobile Internetworking Control Pro.	[JI6]
96	SCC-SP	Semaphore Communications Sec. Pro.	[HXH]
97	ETHERIP	Ethernet-within-IP Encapsulation	[RXH1]
98	ENCAP	Encapsulation Header	[RFC1241,RXB3]
99		any private encryption scheme	[JBP]
100	GMTP	GMTP	[RXB5]
101-254		Unassigned	[JBP]
255		Reserved	[JBP]

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/protocol-numbers

WELL KNOWN PORT NUMBERS

The Well Known Ports are controlled and assigned by the IANA and on most systems can only be used by system (or root) processes or by programs executed by privileged users.

Ports are used in the TCP [RFC793] to name the ends of logical connections which carry long term conversations. For the purpose of providing services to unknown callers, a service contact port is defined. This list specifies the port used by the server process as its contact port. The contact port is sometimes called the "well-known port".

To the extent possible, these same port assignments are used with the UDP [RFC768].

The assigned ports use a small portion of the possible port numbers. For many years the assigned ports were in the range 0-255. Recently, the range for assigned ports managed by the IANA has been expanded to the range 0-1023.

Port Assignments:

Keyword	Decimal	Description	References
	0/tcp	Reserved	
	0/udp	Reserved	
#		Jon Postel <postel@isi.edu>	
tcpmux	1/tcp	TCP Port Service Multiplexer	
tcpmux	1/udp	TCP Port Service Multiplexer	
#		Mark Lottor <MKL@nisc.sri.com>	
compressnet	2/tcp	Management Utility	
compressnet	2/udp	Management Utility	
compressnet	3/tcp	Compression Process	
compressnet	3/udp	Compression Process	
#		Bernie Volz <VOLZ@PROCESS.COM>	
#	4/tcp	Unassigned	
#	4/udp	Unassigned	
rje	5/tcp	Remote Job Entry	
rje	5/udp	Remote Job Entry	
#		Jon Postel <postel@isi.edu>	
#	6/tcp	Unassigned	
#	6/udp	Unassigned	
echo	7/tcp	Echo	
echo	7/udp	Echo	
#		Jon Postel <postel@isi.edu>	
#	8/tcp	Unassigned	

```
#                8/udp    Unassigned
discard          9/tcp    Discard
discard          9/udp    Discard
#                         Jon Postel <postel@isi.edu>
#               10/tcp    Unassigned
#               10/udp    Unassigned
systat          11/tcp    Active Users
systat          11/udp    Active Users
#                         Jon Postel <postel@isi.edu>
#               12/tcp    Unassigned
#               12/udp    Unassigned
daytime         13/tcp    Daytime
daytime         13/udp    Daytime
#                         Jon Postel <postel@isi.edu>
#               14/tcp    Unassigned
#               14/udp    Unassigned
#               15/tcp    Unassigned [was netstat]
#               15/udp    Unassigned
#               16/tcp    Unassigned
#               16/udp    Unassigned
qotd            17/tcp    Quote of the Day
qotd            17/udp    Quote of the Day
#                         Jon Postel <postel@isi.edu>
msp             18/tcp    Message Send Protocol
msp             18/udp    Message Send Protocol
#                         Rina Nethaniel <---none--->
chargen         19/tcp    Character Generator
chargen         19/udp    Character Generator
ftp-data        20/tcp    File Transfer [Default Data]
ftp-data        20/udp    File Transfer [Default Data]
ftp             21/tcp    File Transfer [Control]
ftp             21/udp    File Transfer [Control]
#                         Jon Postel <postel@isi.edu>
#               22/tcp    Unassigned
#               22/udp    Unassigned
telnet          23/tcp    Telnet
telnet          23/udp    Telnet
#                         Jon Postel <postel@isi.edu>
                24/tcp    any private mail system
                24/udp    any private mail system
#                         Rick Adam <rick@UUNET.UU.NET>
smtp            25/tcp    Simple Mail Transfer
smtp            25/udp    Simple Mail Transfer
#                         Jon Postel <postel@isi.edu>
#               26/tcp    Unassigned
#               26/udp    Unassigned
nsw-fe          27/tcp    NSW User System FE
nsw-fe          27/udp    NSW User System FE
```

```
#                               Robert Thomas <BThomas@F.BBN.COM>
#               28/tcp          Unassigned
#               28/udp          Unassigned
msg-icp         29/tcp          MSG ICP
msg-icp         29/udp          MSG ICP
#                               Robert Thomas <BThomas@F.BBN.COM>
#               30/tcp          Unassigned
#               30/udp          Unassigned
msg-auth        31/tcp          MSG Authentication
msg-auth        31/udp          MSG Authentication
#                               Robert Thomas <BThomas@F.BBN.COM>
#               32/tcp          Unassigned
#               32/udp          Unassigned
dsp             33/tcp          Display Support Protocol
dsp             33/udp          Display Support Protocol
#                               Ed Cain <cain@edn-unix.dca.mil>
#               34/tcp          Unassigned
#               34/udp          Unassigned
                35/tcp          any private printer server
                35/udp          any private printer server
#                               Jon Postel <postel@isi.edu>
#               36/tcp          Unassigned
#               36/udp          Unassigned
time            37/tcp          Time
time            37/udp          Time
#                               Jon Postel <postel@isi.edu>
rap             38/tcp          Route Access Protocol
rap             38/udp          Route Access Protocol
#                               Robert Ullmann <ariel@world.std.com>
rlp             39/tcp          Resource Location Protocol
rlp             39/udp          Resource Location Protocol
#                               Mike Accetta <MIKE.ACCETTA@CMU-CS-A.EDU>
#               40/tcp          Unassigned
#               40/udp          Unassigned
graphics        41/tcp          Graphics
graphics        41/udp          Graphics
nameserver      42/tcp          Host Name Server
nameserver      42/udp          Host Name Server
nicname         43/tcp          Who Is
nicname         43/udp          Who Is
mpm-flags       44/tcp          MPM FLAGS Protocol
mpm-flags       44/udp          MPM FLAGS Protocol
mpm             45/tcp          Message Processing Module [recv]
mpm             45/udp          Message Processing Module [recv]
mpm-snd         46/tcp          MPM [default send]
mpm-snd         46/udp          MPM [default send]
#                               Jon Postel <postel@isi.edu>
ni-ftp          47/tcp          NI FTP
```

```
ni-ftp          47/udp    NI FTP
#                         Steve Kille <S.Kille@isode.com>
auditd          48/tcp    Digital Audit Daemon
auditd          48/udp    Digital Audit Daemon
#                         Larry Scott <scott@zk3.dec.com>
login           49/tcp    Login Host Protocol
login           49/udp    Login Host Protocol
#                         Pieter Ditmars <pditmars@BBN.COM>
re-mail-ck      50/tcp    Remote Mail Checking Protocol
re-mail-ck      50/udp    Remote Mail Checking Protocol
#                         Steve Dorner <s-dorner@UIUC.EDU>
la-maint        51/tcp    IMP Logical Address Maintenance
la-maint        51/udp    IMP Logical Address Maintenance
#                         Andy Malis <malis_a@timeplex.com>
xns-time        52/tcp    XNS Time Protocol
xns-time        52/udp    XNS Time Protocol
#                         Susie Armstrong <Armstrong.wbst128@XEROX>
domain          53/tcp    Domain Name Server
domain          53/udp    Domain Name Server
#                         Paul Mockapetris <PVM@ISI.EDU>
xns-ch          54/tcp    XNS Clearinghouse
xns-ch          54/udp    XNS Clearinghouse
#                         Susie Armstrong <Armstrong.wbst128@XEROX>
isi-gl          55/tcp    ISI Graphics Language
isi-gl          55/udp    ISI Graphics Language
xns-auth        56/tcp    XNS Authentication
xns-auth        56/udp    XNS Authentication
#                         Susie Armstrong <Armstrong.wbst128@XEROX>
                57/tcp    any private terminal access
                57/udp    any private terminal access
#                         Jon Postel <postel@isi.edu>
xns-mail        58/tcp    XNS Mail
xns-mail        58/udp    XNS Mail
#                         Susie Armstrong <Armstrong.wbst128@XEROX>
                59/tcp    any private file service
                59/udp    any private file service
#                         Jon Postel <postel@isi.edu>
                60/tcp    Unassigned
                60/udp    Unassigned
ni-mail         61/tcp    NI MAIL
ni-mail         61/udp    NI MAIL
#                         Steve Kille <S.Kille@isode.com>
acas            62/tcp    ACA Services
acas            62/udp    ACA Services
#                         E. Wald <ewald@via.enet.dec.com>
#               63/tcp    Unassigned
#               63/udp    Unassigned
covia           64/tcp    Communications Integrator (CI)
```

```
covia           64/udp    Communications Integrator (CI)
#                         "Tundra" Tim Daneliuk
#                         <tundraix!tundra@clout.chi.il.us>
tacacs-ds       65/tcp    TACACS-Database Service
tacacs-ds       65/udp    TACACS-Database Service
#                         Kathy Huber <khuber@bbn.com>
sql*net         66/tcp    Oracle SQL*NET
sql*net         66/udp    Oracle SQL*NET
#                         Jack Haverty <jhaverty@ORACLE.COM>
bootps          67/tcp    Bootstrap Protocol Server
bootps          67/udp    Bootstrap Protocol Server
bootpc          68/tcp    Bootstrap Protocol Client
bootpc          68/udp    Bootstrap Protocol Client
#                         Bill Croft <Croft@SUMEX-AIM.STANFORD.EDU>
tftp            69/tcp    Trivial File Transfer
tftp            69/udp    Trivial File Transfer
#                         David Clark <ddc@LCS.MIT.EDU>
gopher          70/tcp    Gopher
gopher          70/udp    Gopher
#                         Mark McCahill <mpm@boombox.micro.umn.edu>
netrjs-1        71/tcp    Remote Job Service
netrjs-1        71/udp    Remote Job Service
netrjs-2        72/tcp    Remote Job Service
netrjs-2        72/udp    Remote Job Service
netrjs-3        73/tcp    Remote Job Service
netrjs-3        73/udp    Remote Job Service
netrjs-4        74/tcp    Remote Job Service
netrjs-4        74/udp    Remote Job Service
#                         Bob Braden <Braden@ISI.EDU>
                75/tcp    any private dial out service
                75/udp    any private dial out service
#                         Jon Postel <postel@isi.edu>
deos            76/tcp    Distributed External Object Store
deos            76/udp    Distributed External Object Store
#                         Robert Ullmann <ariel@world.std.com>
                77/tcp    any private RJE service
                77/udp    any private RJE service
#                         Jon Postel <postel@isi.edu>
vettcp          78/tcp    vettcp
vettcp          78/udp    vettcp
#                         Christopher Leong <leong@kolmod.mlo.dec.com>
finger          79/tcp    Finger
finger          79/udp    Finger
#                         David Zimmerman <dpz@RUTGERS.EDU>
www-http        80/tcp    World Wide Web HTTP
www-http        80/udp    World Wide Web HTTP
#                         Tim Berners-Lee <timbl@nxoc01.cern.ch>
hosts2-ns       81/tcp    HOSTS2 Name Server
```

```
hosts2-ns        81/udp    HOSTS2 Name Server
#                          Earl Killian <EAK@MORDOR.S1.GOV>
xfer             82/tcp    XFER Utility
xfer             82/udp    XFER Utility
#                          Thomas M. Smith <tmsmith@esc.syr.ge.com>
mit-ml-dev       83/tcp    MIT ML Device
mit-ml-dev       83/udp    MIT ML Device
#                          David Reed <--none--->
ctf              84/tcp    Common Trace Facility
ctf              84/udp    Common Trace Facility
#                          Hugh Thomas <thomas@oils.enet.dec.com>
mit-ml-dev       85/tcp    MIT ML Device
mit-ml-dev       85/udp    MIT ML Device
#                          David Reed <--none--->
mfcobol          86/tcp    Micro Focus Cobol
mfcobol          86/udp    Micro Focus Cobol
#                          Simon Edwards <--none--->
                 87/tcp    any private terminal link
                 87/udp    any private terminal link
#                          Jon Postel <postel@isi.edu>
kerberos         88/tcp    Kerberos
kerberos         88/udp    Kerberos
#                          B. Clifford Neuman <bcn@isi.edu>
su-mit-tg        89/tcp    SU/MIT Telnet Gateway
su-mit-tg        89/udp    SU/MIT Telnet Gateway
#                          Mark Crispin <MRC@PANDA.COM>
dnsix            90/tcp    DNSIX Securit Attribute Token Map
dnsix            90/udp    DNSIX Securit Attribute Token Map
#                          Charles Watt <watt@sware.com>
mit-dov          91/tcp    MIT Dover Spooler
mit-dov          91/udp    MIT Dover Spooler
#                          Eliot Moss <EBM@XX.LCS.MIT.EDU>
npp              92/tcp    Network Printing Protocol
npp              92/udp    Network Printing Protocol
#                          Louis Mamakos <louie@sayshell.umd.edu>
dcp              93/tcp    Device Control Protocol
dcp              93/udp    Device Control Protocol
#                          Daniel Tappan <Tappan@BBN.COM>
objcall          94/tcp    Tivoli Object Dispatcher
objcall          94/udp    Tivoli Object Dispatcher
#                          Tom Bereiter <--none--->
supdup           95/tcp    SUPDUP
supdup           95/udp    SUPDUP
#                          Mark Crispin <MRC@PANDA.COM>
dixie            96/tcp    DIXIE Protocol Specification
dixie            96/udp    DIXIE Protocol Specification
#                Tim Howes <Tim.Howes@terminator.cc.umich.edu>
swift-rvf        97/tcp    Swift Remote Vitural File Protocol
```

```
swift-rvf        97/udp    Swift Remote Vitural File Protocol
#                          Maurice R. Turcotte
#                97/udp    <mailrus!uflorida!rm1!dnmrt%rmatl@uunet.UU.NET>
tacnews          98/tcp    TAC News
tacnews          98/udp    TAC News
#                          Jon Postel <postel@isi.edu>
metagram         99/tcp    Metagram Relay
metagram         99/udp    Metagram Relay
#                          Geoff Goodfellow <Geoff@FERNWOOD.MPK.CA.U>
newacct         100/tcp    [unauthorized use]
hostname        101/tcp    NIC Host Name Server
hostname        101/udp    NIC Host Name Server
#                          Jon Postel <postel@isi.edu>
iso-tsap        102/tcp    ISO-TSAP
iso-tsap        102/udp    ISO-TSAP
#                          Marshall Rose <mrose@dbc.mtview.ca.us>
gppitnp         103/tcp    Genesis Point-to-Point Trans Net
gppitnp         103/udp    Genesis Point-to-Point Trans Net
acr-nema        104/tcp    ACR-NEMA Digital Imag. & Comm. 300
acr-nema        104/udp    ACR-NEMA Digital Imag. & Comm. 300
#                          Patrick McNamee <--none--->
csnet-ns        105/tcp    Mailbox Name Nameserver
csnet-ns        105/udp    Mailbox Name Nameserver
#                          Marvin Solomon <solomon@CS.WISC.EDU>
3com-tsmux      106/tcp    3COM-TSMUX
3com-tsmux      106/udp    3COM-TSMUX
#                          Jeremy Siegel <jzs@NSD.3Com.COM>
rtelnet         107/tcp    Remote Telnet Service
rtelnet         107/udp    Remote Telnet Service
#                          Jon Postel <postel@isi.edu>
snagas          108/tcp    SNA Gateway Access Server
snagas          108/udp    SNA Gateway Access Server
#                          Kevin Murphy <murphy@sevens.lkg.dec.com>
pop2            109/tcp    Post Office Protocol - Version 2
pop2            109/udp    Post Office Protocol - Version 2
#                          Joyce K. Reynolds <jkrey@isi.edu>
pop3            110/tcp    Post Office Protocol - Version 3
pop3            110/udp    Post Office Protocol - Version 3
#                          Marshall Rose <mrose@dbc.mtview.ca.us>
sunrpc          111/tcp    SUN Remote Procedure Call
sunrpc          111/udp    SUN Remote Procedure Call
#                          Chuck McManis <cmcmanis@sun.com>
mcidas          112/tcp    McIDAS Data Transmission Protocol
mcidas          112/udp    McIDAS Data Transmission Protocol
#                          Glenn Davis <davis@unidata.ucar.edu>
auth            113/tcp    Authentication Service
auth            113/udp    Authentication Service
#                          Mike St. Johns <stjohns@arpa.mil>
```

```
audionews       114/tcp    Audio News Multicast
audionews       114/udp    Audio News Multicast
#                          Martin Forssen <maf@dtek.chalmers.se>
sftp            115/tcp    Simple File Transfer Protocol
sftp            115/udp    Simple File Transfer Protocol
#                          Mark Lottor <MKL@nisc.sri.com>
ansanotify      116/tcp    ANSA REX Notify
ansanotify      116/udp    ANSA REX Notify
#                          Nicola J. Howarth <njh@ansa.co.uk>
uucp-path       117/tcp    UUCP Path Service
uucp-path       117/udp    UUCP Path Service
sqlserv         118/tcp    SQL Services
sqlserv         118/udp    SQL Services
#                          Larry Barnes <barnes@broke.enet.dec.com>
nntp            119/tcp    Network News Transfer Protocol
nntp            119/udp    Network News Transfer Protocol
#                          Phil Lapsley <phil@UCBARPA.BERKELEY.EDU>
cfdptkt         120/tcp    CFDPTKT
cfdptkt         120/udp    CFDPTKT
#                          John Ioannidis <ji@close.cs.columbia.ed>
erpc            121/tcp    Encore Expedited Remote Pro.Call
erpc            121/udp    Encore Expedited Remote Pro.Call
#                          Jack O'Neil <---none--->
smakynet        122/tcp    SMAKYNET
smakynet        122/udp    SMAKYNET
#                          Mike O'Dowd <odowd@ltisun8.epfl.ch>
ntp             123/tcp    Network Time Protocol
ntp             123/udp    Network Time Protocol
#                          Dave Mills <Mills@HUEY.UDEL.EDU>
ansatrader      124/tcp    ANSA REX Trader
ansatrader      124/udp    ANSA REX Trader
#                          Nicola J. Howarth <njh@ansa.co.uk>
locus-map       125/tcp    Locus PC-Interface Net Map Ser
locus-map       125/udp    Locus PC-Interface Net Map Ser
#                          Eric Peterson <lcc.eric@SEAS.UCLA.EDU>
unitary         126/tcp    Unisys Unitary Login
unitary         126/udp    Unisys Unitary Login
#                          <feil@kronos.nisd.cam.unisys.com>
locus-con       127/tcp    Locus PC-Interface Conn Server
locus-con       127/udp    Locus PC-Interface Conn Server
#                          Eric Peterson <lcc.eric@SEAS.UCLA.EDU>
gss-xlicen      128/tcp    GSS X License Verification
gss-xlicen      128/udp    GSS X License Verification
#                          John Light <johnl@gssc.gss.com>
pwdgen          129/tcp    Password Generator Protocol
pwdgen          129/udp    Password Generator Protocol
#               Frank J. Wacho <WANCHO@WSMR-SIMTEL20.ARMY.MIL>
cisco-fna       130/tcp    cisco FNATIVE
```

```
cisco-fna       130/udp    cisco FNATIVE
cisco-tna       131/tcp    cisco TNATIVE
cisco-tna       131/udp    cisco TNATIVE
cisco-sys       132/tcp    cisco SYSMAINT
cisco-sys       132/udp    cisco SYSMAINT
statsrv         133/tcp    Statistics Service
statsrv         133/udp    Statistics Service
#                          Dave Mills <Mills@HUEY.UDEL.EDU>
ingres-net      134/tcp    INGRES-NET Service
ingres-net      134/udp    INGRES-NET Service
#                          Mike Berrow <---none--->
loc-srv         135/tcp    Location Service
loc-srv         135/udp    Location Service
#                          Joe Pato <apollo!pato@EDDIE.MIT.EDU>
profile         136/tcp    PROFILE Naming System
profile         136/udp    PROFILE Naming System
#                          Larry Peterson <llp@ARIZONA.EDU>
netbios-ns      137/tcp    NETBIOS Name Service
netbios-ns      137/udp    NETBIOS Name Service
netbios-dgm     138/tcp    NETBIOS Datagram Service
netbios-dgm     138/udp    NETBIOS Datagram Service
netbios-ssn     139/tcp    NETBIOS Session Service
netbios-ssn     139/udp    NETBIOS Session Service
#                          Jon Postel <postel@isi.edu>
emfis-data      140/tcp    EMFIS Data Service
emfis-data      140/udp    EMFIS Data Service
emfis-cntl      141/tcp    EMFIS Control Service
emfis-cntl      141/udp    EMFIS Control Service
#                          Gerd Beling <GBELING@ISI.EDU>
bl-idm          142/tcp    Britton-Lee IDM
bl-idm          142/udp    Britton-Lee IDM
#                          Susie Snitzer <---none--->
imap2           143/tcp    Interim Mail Access Protocol v2
imap2           143/udp    Interim Mail Access Protocol v2
#                          Mark Crispin <MRC@PANDA.COM>
news            144/tcp    NewS
news            144/udp    NewS
#                          James Gosling <JAG@SUN.COM>
uaac            145/tcp    UAAC Protocol
uaac            145/udp    UAAC Protocol
#               David A. Gomberg <gomberg@GATEWAY.MITRE.ORG>
iso-tp0         146/tcp    ISO-IP0
iso-tp0         146/udp    ISO-IP0
iso-ip          147/tcp    ISO-IP
iso-ip          147/udp    ISO-IP
#                          Marshall Rose <mrose@dbc.mtview.ca.us>
cronus          148/tcp    CRONUS-SUPPORT
cronus          148/udp    CRONUS-SUPPORT
```

```
#                               Jeffrey Buffun <jbuffum@APOLLO.COM>
aed-512         149/tcp         AED 512 Emulation Service
aed-512         149/udp         AED 512 Emulation Service
#               Albert G. Broscius <broscius@DSL.CIS.UPENN.EDU>
sql-net         150/tcp         SQL-NET
sql-net         150/udp         SQL-NET
#                               Martin Picard <<---none--->
hems            151/tcp         HEMS
hems            151/udp         HEMS
#                               Christopher Tengi <tengi@Princeton.EDU>
bftp            152/tcp         Background File Transfer Program
bftp            152/udp         Background File Transfer Program
#                               Annette DeSchon <DESCHON@ISI.EDU>
sgmp            153/tcp         SGMP
sgmp            153/udp         SGMP
#                               Marty Schoffstahl <schoff@NISC.NYSER.NET>
netsc-prod      154/tcp         NETSC
netsc-prod      154/udp         NETSC
netsc-dev       155/tcp         NETSC
netsc-dev       155/udp         NETSC
#                               Sergio Heker <heker@JVNCC.CSC.ORG>
sqlsrv          156/tcp         SQL Service
sqlsrv          156/udp         SQL Service
#                               Craig Rogers <Rogers@ISI.EDU>
knet-cmp        157/tcp         KNET/VM Command/Message Protocol
knet-cmp        157/udp         KNET/VM Command/Message Protocol
#                               Gary S. Malkin <GMALKIN@XYLOGICS.COM>
pcmail-srv      158/tcp         PCMail Server
pcmail-srv      158/udp         PCMail Server
#                               Mark L. Lambert <markl@PTT.LCS.MIT.EDU>
nss-routing     159/tcp         NSS-Routing
nss-routing     159/udp         NSS-Routing
#                               Yakov Rekhter <Yakov@IBM.COM>
sgmp-traps      160/tcp         SGMP-TRAPS
sgmp-traps      160/udp         SGMP-TRAPS
#                               Marty Schoffstahl <schoff@NISC.NYSER.NET>
snmp            161/tcp         SNMP
snmp            161/udp         SNMP
snmptrap        162/tcp         SNMPTRAP
snmptrap        162/udp         SNMPTRAP
#                               Marshall Rose <mrose@dbc.mtview.ca.us>
cmip-man        163/tcp         CMIP/TCP Manager
cmip-man        163/udp         CMIP/TCP Manager
cmip-agent      164/tcp         CMIP/TCP Agent
smip-agent      164/udp         CMIP/TCP Agent
#                               Amatzia Ben-Artzi <---none--->
xns-courier     165/tcp         Xerox
xns-courier     165/udp         Xerox
```

```
#                                   Susie Armstrong <Armstrong.wbst128@XEROX.COM>
s-net           166/tcp             Sirius Systems
s-net           166/udp             Sirius Systems
#                                   Brian Lloyd <---none--->
namp            167/tcp             NAMP
namp            167/udp             NAMP
#                                   Marty Schoffstahl <schoff@NISC.NYSER.NET>
rsvd            168/tcp             RSVD
rsvd            168/udp             RSVD
#                                   Neil Todd <mcvax!ist.co.uk!neil@UUNET.UU.NET>
send            169/tcp             SEND
send            169/udp             SEND
#                                  William D. Wisner <wisner@HAYES.FAI.ALASKA.EDU>
print-srv       170/tcp             Network PostScript
print-srv       170/udp             Network PostScript
#                                   Brian Reid <reid@DECWRL.DEC.COM>
multiplex       171/tcp             Network Innovations Multiplex
multiplex       171/udp             Network Innovations Multiplex
cl/1            172/tcp             Network Innovations CL/1
cl/1            172/udp             Network Innovations CL/1
#                                   Kevin DeVault <<---none--->
xyplex-mux      173/tcp             Xyplex
xyplex-mux      173/udp             Xyplex
#                                   Bob Stewart <STEWART@XYPLEX.COM>
mailq           174/tcp             MAILQ
mailq           174/udp             MAILQ
#                                   Rayan Zachariassen <rayan@AI.TORONTO.EDU>
vmnet           175/tcp             VMNET
vmnet           175/udp             VMNET
#                                   Christopher Tengi <tengi@Princeton.EDU>
genrad-mux      176/tcp             GENRAD-MUX
genrad-mux      176/udp             GENRAD-MUX
#                                   Ron Thornton <thornton@qm7501.genrad.com>
xdmcp           177/tcp             X Display Manager Control Protocol
xdmcp           177/udp             X Display Manager Control Protocol
#                                   Robert W. Scheifler <RWS@XX.LCS.MIT.EDU>
nextstep        178/tcp             NextStep Window Server
NextStep        178/udp             NextStep Window Server
#                                   Leo Hourvitz <leo@NEXT.COM>
bgp             179/tcp             Border Gateway Protocol
bgp             179/udp             Border Gateway Protocol
#                                   Kirk Lougheed <LOUGHEED@MATHOM.CISCO.COM>
ris             180/tcp             Intergraph
ris             180/udp             Intergraph
#                                   Dave Buehmann <ingr!daveb@UUNET.UU.NET>
unify           181/tcp             Unify
unify           181/udp             Unify
#                                   Vinod Singh <--none--->
```

```
audit           182/tcp    Unisys Audit SITP
audit           182/udp    Unisys Audit SITP
#                          Gil Greenbaum <gcole@nisd.cam.unisys.com>
ocbinder        183/tcp    OCBinder
ocbinder        183/udp    OCBinder
ocserver        184/tcp    OCServer
ocserver        184/udp    OCServer
#                          Jerrilynn Okamura <--none--->
remote-kis      185/tcp    Remote-KIS
remote-kis      185/udp    Remote-KIS
kis             186/tcp    KIS Protocol
kis             186/udp    KIS Protocol
#                          Ralph Droms <rdroms@NRI.RESTON.VA.US>
aci             187/tcp    Application Communication Interface
aci             187/udp    Application Communication Interface
#                          Rick Carlos <rick.ticipa.csc.ti.com>
mumps           188/tcp    Plus Five's MUMPS
mumps           188/udp    Plus Five's MUMPS
#                          Hokey Stenn <hokey@PLUS5.COM>
qft             189/tcp    Queued File Transport
qft             189/udp    Queued File Transport
#                          Wayne Schroeder <schroeder@SDS.SDSC.EDU>
gacp            190/tcp    Gateway Access Control Protocol
cacp            190/udp    Gateway Access Control Protocol
#                          C. Philip Wood <cpw@LANL.GOV>
prospero        191/tcp    Prospero Directory Service
prospero        191/udp    Prospero Directory Service
#                          B. Clifford Neuman <bcn@isi.edu>
osu-nms         192/tcp    OSU Network Monitoring System
osu-nms         192/udp    OSU Network Monitoring System
#               Doug Karl <KARL-D@OSU-20.IRCC.OHIO-STATE.EDU>
srmp            193/tcp    Spider Remote Monitoring Protocol
srmp            193/udp    Spider Remote Monitoring Protocol
#                          Ted J. Socolofsky <Teds@SPIDER.CO.UK>
irc             194/tcp    Internet Relay Chat Protocol
irc             194/udp    Internet Relay Chat Protocol
#                          Jarkko Oikarinen <jto@TOLSUN.OULU.FI>
dn6-nlm-aud     195/tcp    DNSIX Network Level Module Audit
dn6-nlm-aud     195/udp    DNSIX Network Level Module Audit
dn6-smm-red     196/tcp    DNSIX Session Mgt Module Audit Redir
dn6-smm-red     196/udp    DNSIX Session Mgt Module Audit Redir
#                          Lawrence Lebahn <DIA3@PAXRV-NES.NAVY.MIL>
dls             197/tcp    Directory Location Service
dls             197/udp    Directory Location Service
dls-mon         198/tcp    Directory Location Service Monitor
dls-mon         198/udp    Directory Location Service Monitor
#                          Scott Bellew <smb@cs.purdue.edu>
smux            199/tcp    SMUX
```

```
smux            199/udp    SMUX
#                          Marshall Rose <mrose@dbc.mtview.ca.us>
src             200/tcp    IBM System Resource Controller
src             200/udp    IBM System Resource Controller
#                          Gerald McBrearty <---none--->
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
#                          Rob Chandhok <chandhok@gnome.cs.cmu.edu>
tam             209/tcp    Trivial Authenticated Mail Protocol
tam             209/udp    Trivial Authenticated Mail Protocol
#                          Dan Bernstein <brnstnd@stealth.acf.nyu.edu>
z39.50          210/tcp    ANSI Z39.50
z39.50          210/udp    ANSI Z39.50
#                          Mark Needleman
#                         <mhnur%uccmvsa.bitnet@cornell.cit.cornell.edu>
914c/g          211/tcp    Texas Instruments 914C/G Terminal
914c/g          211/udp    Texas Instruments 914C/G Terminal
#                          Bill Harrell <---none--->
anet            212/tcp    ATEXSSTR
anet            212/udp    ATEXSSTR
#                          Jim Taylor <taylor@heart.epps.kodak.com>
ipx             213/tcp    IPX
ipx             213/udp    IPX
#                          Don Provan <donp@xlnvax.novell.com>
vmpwscs         214/tcp    VM PWSCS
vmpwscs         214/udp    VM PWSCS
#                          Dan Shia <dset!shia@uunet.UU.NET>
softpc          215/tcp    Insignia Solutions
softpc          215/udp    Insignia Solutions
#                          Martyn Thomas <---none--->
atls            216/tcp    Access Technology License Server
atls            216/udp    Access Technology License Server
#                          Larry DeLuca <henrik@EDDIE.MIT.EDU>
dbase           217/tcp    dBASE Unix
```

```
dbase           217/udp    dBASE Unix
#                          Don Gibson
#          <sequent!aero!twinsun!ashtate.A-T.COM!dong@uunet.UU.NET>
mpp             218/tcp    Netix Message Posting Protocol
mpp             218/udp    Netix Message Posting Protocol
#                          Shannon Yeh <yeh@netix.com>
uarps           219/tcp    Unisys ARPs
uarps           219/udp    Unisys ARPs
#                          Ashok Marwaha <---none--->
imap3           220/tcp    Interactive Mail Access Protocol v3
imap3           220/udp    Interactive Mail Access Protocol v3
#                          James Rice <RICE@SUMEX-AIM.STANFORD.EDU>
fln-spx         221/tcp    Berkeley rlogind with SPX auth
fln-spx         221/udp    Berkeley rlogind with SPX auth
rsh-spx         222/tcp    Berkeley rshd with SPX auth
rsh-spx         222/udp    Berkeley rshd with SPX auth
cdc             223/tcp    Certificate Distribution Center
cdc             223/udp    Certificate Distribution Center
#               Kannan Alagappan <kannan@sejour.enet.dec.com>
#               224-241    Reserved
#                          Jon Postel <postel@isi.edu>
#               242/tcp    Unassigned
#               242/udp    Unassigned
sur-meas        243/tcp    Survey Measurement
sur-meas        243/udp    Survey Measurement
#                          Dave Clark <ddc@LCS.MIT.EDU>
#               244/tcp    Unassigned
#               244/udp    Unassigned
link            245/tcp    LINK
link            245/udp    LINK
dsp3270         246/tcp    Display Systems Protocol
dsp3270         246/udp    Display Systems Protocol
#                          Weldon J. Showalter <Gamma@MINTAKA.DCA.MIL>
#               247-255    Reserved
#                          Jon Postel <postel@isi.edu>
#               256-343    Unassigned
pdap            344/tcp    Prospero Data Access Protocol
pdap            344/udp    Prospero Data Access Protocol
#                          B. Clifford Neuman <bcn@isi.edu>
pawserv         345/tcp    Perf Analysis Workbench
pawserv         345/udp    Perf Analysis Workbench
zserv           346/tcp    Zebra server
zserv           346/udp    Zebra server
fatserv         347/tcp    Fatmen Server
fatserv         347/udp    Fatmen Server
csi-sgwp        348/tcp    Cabletron Management Protocol
csi-sgwp        348/udp    Cabletron Management Protocol
#               349-370    Unassigned
```

```
clearcase       371/tcp    Clearcase
clearcase       371/udp    Clearcase
#                          Dave LeBlang <leglang@atria.com>
ulistserv       372/tcp    Unix Listserv
ulistserv       372/udp    Unix Listserv
#                          Anastasios Kotsikonas <tasos@cs.bu.edu>
legent-1        373/tcp    Legent Corporation
legent-1        373/udp    Legent Corporation
legent-2        374/tcp    Legent Corporation
legent-2        374/udp    Legent Corporation
#                          Keith Boyce <---none--->
hassle          375/tcp    Hassle
hassle          375/udp    Hassle
#                          Reinhard Doelz <doelz@comp.bioz.unibas.ch>
nip             376/tcp    Amiga Envoy Network Inquiry Proto
nip             376/udp    Amiga Envoy Network Inquiry Proto
#                          Kenneth Dyke <kcd@cbmvax.cbm.commodore.com>
tnETOS          377/tcp    NEC Corporation
tnETOS          377/udp    NEC Corporation
dsETOS          378/tcp    NEC Corporation
dsETOS          378/udp    NEC Corporation
#                          Tomoo Fujita <tf@arc.bs1.fc.nec.co.jp>
is99c           379/tcp    TIA/EIA/IS-99 modem client
is99c           379/udp    TIA/EIA/IS-99 modem client
is99s           380/tcp    TIA/EIA/IS-99 modem server
is99s           380/udp    TIA/EIA/IS-99 modem server
#                          Frank Quick <fquick@qualcomm.com>
hp-collector    381/tcp    hp performance data collector
hp-collector    381/udp    hp performance data collector
hp-managed-node 382/tcp    hp performance data managed node
hp-managed-node 382/udp    hp performance data managed node
hp-alarm-mgr    383/tcp    hp performance data alarm manager
hp-alarm-mgr    383/udp    hp performance data alarm manager
#                          Frank Blakely <frankb@hpptc16.rose.hp.com>
arns            384/tcp    A Remote Network Server System
arns            384/udp    A Remote Network Server System
#                          David Hornsby <djh@munnari.OZ.AU>
ibm-app         385/tcp    IBM Application
ibm-app         385/tcp    IBM Application
#                          Lisa Tomita <---none--->
asa             386/tcp    ASA Message Router Object Def.
asa             386/udp    ASA Message Router Object Def.
#                          Steve Laitinen <laitinen@brutus.aa.ab.com>
aurp            387/tcp    Appletalk Update-Based Routing Pro.
aurp            387/udp    Appletalk Update-Based Routing Pro.
#                          Chris Ranch <cranch@novell.com>
unidata-ldm     388/tcp    Unidata LDM Version 4
unidata-ldm     388/udp    Unidata LDM Version 4
```

```
#                               Glenn Davis <davis@unidata.ucar.edu>
ldap            389/tcp         Lightweight Directory Access Protocol
ldap            389/udp         Lightweight Directory Access Protocol
#                               Tim Howes <Tim.Howes@terminator.cc.umich.edu>
uis             390/tcp         UIS
uis             390/udp         UIS
#                               Ed Barron <---none--->
synotics-relay  391/tcp         SynOptics SNMP Relay Port
synotics-relay  391/udp         SynOptics SNMP Relay Port
synotics-broker 392/tcp         SynOptics Port Broker Port
synotics-broker 392/udp         SynOptics Port Broker Port
#                               Illan Raab <iraab@synoptics.com>
dis             393/tcp         Data Interpretation System
dis             393/udp         Data Interpretation System
#                               Paul Stevens <pstevens@chinacat.Metaphor.COM>
embl-ndt        394/tcp         EMBL Nucleic Data Transfer
embl-ndt        394/udp         EMBL Nucleic Data Transfer
#                               Peter Gad <peter@bmc.uu.se>
netcp           395/tcp         NETscout Control Protocol
netcp           395/udp         NETscout Control Protocol
#                               Anil Singhal <---none--->
netware-ip      396/tcp         Novell Netware over IP
netware-ip      396/udp         Novell Netware over IP
mptn            397/tcp         Multi Protocol Trans. Net.
mptn            397/udp         Multi Protocol Trans. Net.
#                               Soumitra Sarkar <sarkar@vnet.ibm.com>
kryptolan       398/tcp         Kryptolan
kryptolan       398/udp         Kryptolan
#                               Peter de Laval <pdl@sectra.se>
#               399/tcp         Unassigned
#               399/udp         Unassigned
work-sol        400/tcp         Workstation Solutions
work-sol        400/udp         Workstation Solutions
#                               Jim Ward <jimw@worksta.com>
ups             401/tcp         Uninterruptible Power Supply
ups             401/udp         Uninterruptible Power Supply
#                               Guenther Seybold <gs@hrz.th-darmstadt.de>
genie           402/tcp         Genie Protocol
genie           402/udp         Genie Protocol
#                               Mark Hankin <---none--->
decap           403/tcp         decap
decap           403/udp         decap
nced            404/tcp         nced
nced            404/udp         nced
ncld            405/tcp         ncld
ncld            405/udp         ncld
#                               Richard Jones <---none--->
imsp            406/tcp         Interactive Mail Support Protocol
```

```
imsp            406/udp    Interactive Mail Support Protocol
#                          John Myers <jgm+@cmu.edu>
timbuktu        407/tcp    Timbuktu
timbuktu        407/udp    Timbuktu
#                          Marc Epard <marc@waygate.farallon.com>
prm-sm          408/tcp    Prospero Resource Manager Sys. Man.
prm-sm          408/udp    Prospero Resource Manager Sys. Man.
prm-nm          409/tcp    Prospero Resource Manager Node Man.
prm-nm          409/udp    Prospero Resource Manager Node Man.
#                          B. Clifford Neuman <bcn@isi.edu>
decladebug      410/tcp    DECLadebug Remote Debug Protocol
decladebug      410/udp    DECLadebug Remote Debug Protocol
#                          Anthony Berent <berent@rdgeng.enet.dec.com>
rmt             411/tcp    Remote MT Protocol
rmt             411/udp    Remote MT Protocol
#                          Peter Eriksson <pen@lysator.liu.se>
synoptics-trap  412/tcp    Trap Convention Port
synoptics-trap  412/udp    Trap Convention Port
#                          Illan Raab <iraab@synoptics.com>
smsp            413/tcp    SMSP
smsp            413/udp    SMSP
infoseek        414/tcp    InfoSeek
infoseek        414/udp    InfoSeek
#                          Steve Kirsch <stk@frame.com>
bnet            415/tcp    BNet
bnet            415/udp    BNet
#                          Jim Mertz <JMertz+RV09@rvdc.unisys.com>
silverplatter   416/tcp    Silverplatter
silverplatter   416/udp    Silverplatter
#                          Peter Ciuffetti <petec@silverplatter.com>
onmux           417/tcp    Onmux
onmux           417/udp    Onmux
#                          Stephen Hanna <hanna@world.std.com>
hyper-g         418/tcp    Hyper-G
hyper-g         418/udp    Hyper-G
#                          Frank Kappe <fkappe@iicm.tu-graz.ac.at>
ariel1          419/tcp    Ariel
ariel1          419/udp    Ariel
#                          Jonathan Lavigne <BL.JPL@RLG.Stanford.EDU>
smpte           420/tcp    SMPTE
smpte           420/udp    SMPTE
#                          Si Becker <71362.22@CompuServe.COM>
ariel2          421/tcp    Ariel
ariel2          421/udp    Ariel
ariel3          422/tcp    Ariel
ariel3          422/udp    Ariel
#                          Jonathan Lavigne  <BL.JPL@RLG.Stanford.EDU>
opc-job-start   423/tcp    IBM Operations Planning and Control Start
```

```
opc-job-start   423/udp    IBM Operations Planning and Control Start
opc-job-track   424/tcp    IBM Operations Planning and Control Track
opc-job-track   424/udp    IBM Operations Planning and Control Track
#                          Conny Larsson  <cocke@VNET.IBM.COM>
icad-el         425/tcp    ICAD
icad-el         425/udp    ICAD
#                          Larry Stone  <lcs@icad.com>
smartsdp        426/tcp    smartsdp
smartsdp        426/udp    smartsdp
#                          Alexander Dupuy <dupuy@smarts.com>
svrloc          427/tcp    Server Location
svrloc          427/udp    Server Location
#                          <veizades@ftp.com>
ocs_cmu         428/tcp    OCS_CMU
ocs_cmu         428/udp    OCS_CMU
ocs_amu         429/tcp    OCS_AMU
ocs_amu         429/udp    OCS_AMU
#                          Florence Wyman <wyman@peabody.plk.af.mil>
utmpsd          430/tcp    UTMPSD
utmpsd          430/udp    UTMPSD
utmpcd          431/tcp    UTMPCD
utmpcd          431/udp    UTMPCD
iasd            432/tcp    IASD
iasd            432/udp    IASD
#                          Nir Baroz <nbaroz@encore.com>
nnsp            433/tcp    NNSP
nnsp            433/udp    NNSP
#                          Rob Robertson <rob@gangrene.berkeley.edu>
mobileip-agent  434/tcp    MobileIP-Agent
mobileip-agent  434/udp    MobileIP-Agent
mobilip-mn      435/tcp    MobilIP-MN
mobilip-mn      435/udp    MobilIP-MN
#                          Kannan Alagappan <kannan@sejour.lkg.dec.com>
dna-cml         436/tcp    DNA-CML
dna-cml         436/udp    DNA-CML
#                          Dan Flowers <flowers@smaug.lkg.dec.com>
comscm          437/tcp    comscm
comscm          437/udp    comscm
#                          Jim Teague <teague@zso.dec.com>
dsfgw           438/tcp    dsfgw
dsfgw           438/udp    dsfgw
#                          Andy McKeen <mckeen@osf.org>
dasp            439/tcp    dasp      Thomas Obermair
dasp            439/udp    dasp      tommy@inlab.m.eunet.de
#                          Thomas Obermair <tommy@inlab.m.eunet.de>
sgcp            440/tcp    sgcp
sgcp            440/udp    sgcp
#                          Marshall Rose <mrose@dbc.mtview.ca.us>
```

```
decvms-sysmgt   441/tcp    decvms-sysmgt
decvms-sysmgt   441/udp    decvms-sysmgt
#                          Lee Barton <barton@star.enet.dec.com>
cvc_hostd       442/tcp    cvc_hostd
cvc_hostd       442/udp    cvc_hostd
#                          Bill Davidson <billd@equalizer.cray.com>
https           443/tcp    https  MCom
https           443/udp    https  MCom
#                          Kipp E.B. Hickman <kipp@mcom.com>
snpp            444/tcp    Simple Network Paging Protocol
snpp            444/udp    Simple Network Paging Protocol
#                          [RFC1568]
microsoft-ds    445/tcp    Microsoft-DS
microsoft-ds    445/udp    Microsoft-DS
#                          Arnold Miller <arnoldm@microsoft.com>
ddm-rdb         446/tcp    DDM-RDB
ddm-rdb         446/udp    DDM-RDB
ddm-dfm         447/tcp    DDM-RFM
ddm-dfm         447/udp    DDM-RFM
ddm-byte        448/tcp    DDM-BYTE
ddm-byte        448/udp    DDM-BYTE
#                          Jan David Fisher <jdfisher@VNET.IBM.COM>
as-servermap    449/tcp    AS Server Mapper
as-servermap    449/udp    AS Server Mapper
#                          Barbara Foss <BGFOSS@rchvmv.vnet.ibm.com>
tserver         450/tcp    TServer
tserver         450/udp    TServer
#                          Harvey S. Schultz <hss@mtgzfs3.mt.att.com>
#               451-511    Unassigned
exec            512/tcp    remote process execution;
#                          authentication performed using
#                          passwords and UNIX loppgin names
biff            512/udp    used by mail system to notify users
#                          of new mail received; currently
#                          receives messages only from
#                          processes on the same machine
login           513/tcp    remote login a la telnet;
#                          automatic authentication performed
#                          based on priviledged port numbers
#                          and distributed data bases which
#                          identify "authentication domains"
who             513/udp    maintains data bases showing who's
#                          logged in to machines on a local
#                          net and the load average of the
#                          machine
cmd             514/tcp    like exec, but automatic
#                          authentication is performed as for
#                          login server
```

```
syslog          514/udp
printer         515/tcp    spooler
printer         515/udp    spooler
#               516/tcp    Unassigned
#               516/udp    Unassigned
talk            517/tcp    like tenex link, but across
#                          machine - unfortunately, doesn't
#                          use link protocol (this is actually
#                          just a rendezvous port from which a
#                          tcp connection is established)
talk            517/udp    like tenex link, but across
#                          machine - unfortunately, doesn't
#                          use link protocol (this is actually
#                          just a rendezvous port from which a
                           tcp connection is established)
ntalk           518/tcp
ntalk           518/udp
utime           519/tcp    unixtime
utime           519/udp    unixtime
efs             520/tcp    extended file name server
router          520/udp    local routing process (on site);
#                          uses variant of Xerox NS routing
#                          information protocol
#               521-524    Unassigned
timed           525/tcp    timeserver
timed           525/udp    timeserver
tempo           526/tcp    newdate
tempo           526/udp    newdate
#               527-529    Unassigned
courier         530/tcp    rpc
courier         530/udp    rpc
conference      531/tcp    chat
conference      531/udp    chat
netnews         532/tcp    readnews
netnews         532/udp    readnews
netwall         533/tcp    for emergency broadcasts
netwall         533/udp    for emergency broadcasts
#               534-538    Unassigned
apertus-ldp     539/tcp    Apertus Technologies Load Determination
apertus-ldp     539/udp    Apertus Technologies Load Determination
uucp            540/tcp    uucpd
uucp            540/udp    uucpd
uucp-rlogin     541/tcp    uucp-rlogin  Stuart Lynne
uucp-rlogin     541/udp    uucp-rlogin  sl@wimsey.com
#               542/tcp    Unassigned
#               542/udp    Unassigned
klogin          543/tcp
klogin          543/udp
```

```
kshell          544/tcp    krcmd
kshell          544/udp    krcmd
#               545-549    Unassigned
new-rwho        550/tcp    new-who
new-rwho        550/udp    new-who
#               551-555    Unassigned
dsf             555/tcp
dsf             555/udp
remotefs        556/tcp    rfs server
remotefs        556/udp    rfs server
#               557-559    Unassigned
rmonitor        560/tcp    rmonitord
rmonitor        560/udp    rmonitord
monitor         561/tcp
monitor         561/udp
chshell         562/tcp    chcmd
chshell         562/udp    chcmd
#               563/tcp    Unassigned
#               563/udp    Unassigned
9pfs            564/tcp    plan 9 file service
9pfs            564/udp    plan 9 file service
whoami          565/tcp    whoami
whoami          565/udp    whoami
#               566-569    Unassigned
meter           570/tcp    demon
meter           570/udp    demon
meter           571/tcp    udemon
meter           571/udp    udemon
#               572-599    Unassigned
ipcserver       600/tcp    Sun IPC server
ipcserver       600/udp    Sun IPC server
nqs             607/tcp    nqs
nqs             607/udp    nqs
urm             606/tcp    Cray Unified Resource Manager
urm             606/udp    Cray Unified Resource Manager
#                          Bill Schiefelbein <schief@aspen.cray.com>
sift-uft        608/tcp    Sender-Initiated/Unsolicited File Transfer
sift-uft        608/udp    Sender-Initiated/Unsolicited File Transfer
#                          Rick Troth <troth@rice.edu>
npmp-trap       609/tcp    npmp-trap
npmp-trap       609/udp    npmp-trap
npmp-local      610/tcp    npmp-local
npmp-local      610/udp    npmp-local
npmp-gui        611/tcp    npmp-gui
npmp-gui        611/udp    npmp-gui
#                          John Barnes <jbarnes@crl.com>
ginad           634/tcp    ginad
ginad           634/udp    ginad
```

```
#                               Mark Crother <mark@eis.calstate.edu>
mdqs            666/tcp
mdqs            666/udp
doom            666/tcp     doom Id Software
doom            666/tcp     doom Id Software
#                           <ddt@idcube.idsoftware.com>
elcsd           704/tcp     errlog copy/server daemon
elcsd           704/udp     errlog copy/server daemon

entrustmanager  709/tcp     EntrustManager
entrustmanager  709/udp     EntrustManager
#                           Peter Whittaker <pww@bnr.ca>
netviewdm1      729/tcp     IBM NetView DM/6000 Server/Client
netviewdm1      729/udp     IBM NetView DM/6000 Server/Client
netviewdm2      730/tcp     IBM NetView DM/6000 send/tcp
netviewdm2      730/udp     IBM NetView DM/6000 send/tcp
netviewdm3      731/tcp     IBM NetView DM/6000 receive/tcp
netviewdm3      731/udp     IBM NetView DM/6000 receive/tcp
#                           Philippe Binet  (phbinet@vnet.IBM.COM)
netgw           741/tcp     netGW
netgw           741/udp     netGW
netrcs          742/tcp     Network based Rev. Cont. Sys.
netrcs          742/udp     Network based Rev. Cont. Sys.
#                           Gordon C. Galligher <gorpong@ping.chi.il.us>
flexlm          744/tcp     Flexible License Manager
flexlm          744/udp     Flexible License Manager
#                           Matt Christiano
#                           <globes@matt@oliveb.atc.olivetti.com>
fujitsu-dev     747/tcp     Fujitsu Device Control
fujitsu-dev     747/udp     Fujitsu Device Control
ris-cm          748/tcp     Russell Info Sci Calendar Manager
ris-cm          748/udp     Russell Info Sci Calendar Manager
kerberos-adm    749/tcp     kerberos administration
kerberos-adm    749/udp     kerberos administration
rfile           750/tcp
loadav          750/udp
pump            751/tcp
pump            751/udp
qrh             752/tcp
qrh             752/udp
rrh             753/tcp
rrh             753/udp
tell            754/tcp      send
tell            754/udp      send
nlogin          758/tcp
nlogin          758/udp
con             759/tcp
con             759/udp
```

```
ns              760/tcp
ns              760/udp
rxe             761/tcp
rxe             761/udp
quotad          762/tcp
quotad          762/udp
cycleserv       763/tcp
cycleserv       763/udp
omserv          764/tcp
omserv          764/udp
webster         765/tcp
webster         765/udp
phonebook       767/tcp    phone
phonebook       767/udp    phone
vid             769/tcp
vid             769/udp
cadlock         770/tcp
cadlock         770/udp
rtip            771/tcp
rtip            771/udp
cycleserv2      772/tcp
cycleserv2      772/udp
submit          773/tcp
notify          773/udp
rpasswd         774/tcp
acmaint_dbd     774/udp
entomb          775/tcp
acmaint_transd  775/udp
wpages          776/tcp
wpages          776/udp
wpgs            780/tcp
wpgs            780/udp
concert         786/tcp       Concert
concert         786/udp       Concert
#                             Josyula R. Rao <jrrao@watson.ibm.com>
mdbs_daemon     800/tcp
mdbs_daemon     800/udp
device          801/tcp
device          801/udp
xtreelic        996/tcp        Central Point Software
xtreelic        996/udp        Central Point Software
#                              Dale Cabell <dacabell@smtp.xtree.com>
maitrd          997/tcp
maitrd          997/udp
busboy          998/tcp
puparp          998/udp
garcon          999/tcp
applix          999/udp        Applix ac
```

```
puprouter       999/tcp
puprouter       999/udp
cadlock         1000/tcp
ock             1000/udp
                1023/tcp       Reserved
                1024/udp       Reserved
#                              IANA <iana@isi.edu>
```

REGISTERED PORT NUMBERS

The Registered Ports are not controlled by the IANA and on most systems can be used by ordinary user processes or programs executed by ordinary users.

Ports are used in the TCP [RFC793] to name the ends of logical connections which carry long term conversations. For the purpose of providing services to unknown callers, a service contact port is defined. This list specifies the port used by the server process as its contact port. While the IANA can not control uses of these ports it does register or list uses of these ports as a convienence to the community.

To the extent possible, these same port assignments are used with the UDP [RFC768].

The Registered Ports are in the range 1024-65535.

Port Assignments:

```
Keyword         Decimal    Description                     References
-------         -------    -----------                     ----------
                1024/tcp   Reserved
                1024/udp   Reserved
#                          IANA <iana@isi.edu>
blackjack       1025/tcp   network blackjack
blackjack       1025/udp   network blackjack
iad1            1030/tcp   BBN IAD
iad1            1030/udp   BBN IAD
iad2            1031/tcp   BBN IAD
iad2            1031/udp   BBN IAD
iad3            1032/tcp   BBN IAD
iad3            1032/udp   BBN IAD
#                          Andy Malis <malis_a@timeplex.com>
instl_boots     1067/tcp   Installation Bootstrap Proto. Serv.
instl_boots     1067/udp   Installation Bootstrap Proto. Serv.
instl_bootc     1068/tcp   Installation Bootstrap Proto. Cli.
```

```
instl_bootc     1068/udp   Installation Bootstrap Proto. Cli.
#                          David Arko <<darko@hpfcrn.fc.hp.com>
socks           1080/tcp   Socks
socks           1080/udp   Socks
#                          Ying-Da Lee <ylee@syl.dl.nec.com
ansoft-lm-1     1083/tcp   Anasoft License Manager
ansoft-lm-1     1083/udp   Anasoft License Manager
ansoft-lm-2     1084/tcp   Anasoft License Manager
ansoft-lm-2     1084/udp   Anasoft License Manager
nfa             1155/tcp   Network File Access
nfa             1155/udp   Network File Access
#                          James Powell <james@mailhost.unidata.com>
nerv            1222/tcp   SNI R&D network
nerv            1222/udp   SNI R&D network
#                          Martin Freiss <freiss.pad@sni.de>
hermes          1248/tcp
hermes          1248/udp
alta-ana-lm     1346/tcp   Alta Analytics License Manager
alta-ana-lm     1346/udp   Alta Analytics License Manager
bbn-mmc         1347/tcp   multi media conferencing
bbn-mmc         1347/udp   multi media conferencing
bbn-mmx         1348/tcp   multi media conferencing
bbn-mmx         1348/udp   multi media conferencing
sbook           1349/tcp   Registration Network Protocol
sbook           1349/udp   Registration Network Protocol
editbench       1350/tcp   Registration Network Protocol
editbench       1350/udp   Registration Network Protocol
#               Simson L. Garfinkel <simsong@next.cambridge.ma.us>
equationbuilder 1351/tcp   Digital Tool Works (MIT)
equationbuilder 1351/udp   Digital Tool Works (MIT)
#                          Terrence J. Talbot <lexcube!tjt@bu.edu>
lotusnote       1352/tcp   Lotus Note
lotusnote       1352/udp   Lotus Note
#               Greg Pflaum <iris.com!Greg_Pflaum@uunet.uu.net>
relief          1353/tcp   Relief Consulting
relief          1353/udp   Relief Consulting
#                          John Feiler <relief!jjfeiler@uu2.psi.com>
rightbrain      1354/tcp   RightBrain Software
rightbrain      1354/udp   RightBrain Software
#                          Glenn Reid <glann@rightbrain.com>
intuitive edge  1355/tcp   Intuitive Edge
intuitive edge  1355/udp   Intuitive Edge
#                          Montgomery Zukowski
#                          <monty@nextnorth.acs.ohio-state.edu>
cuillamartin    1356/tcp   CuillaMartin Company
cuillamartin    1356/udp   CuillaMartin Company
pegboard        1357/tcp   Electronic PegBoard
pegboard        1357/udp   Electronic PegBoard
```

```
#                               Chris Cuilla
#                               <balr!vpnet!cuilla!chris@clout.chi.il.us>
connlcli        1358/tcp        CONNLCLI
connlcli        1358/udp        CONNLCLI
ftsrv           1359/tcp        FTSRV
ftsrv           1359/udp        FTSRV
#                               Ines Homem de Melo <sidinf@brfapesp.bitnet>
mimer           1360/tcp        MIMER
mimer           1360/udp        MIMER
#                               Per Schroeder  <Per.Schroder@mimer.se>
linx            1361/tcp        LinX
linx            1361/udp        LinX
#                               Steffen Schilke <---none--->
timeflies       1362/tcp        TimeFlies
timeflies       1362/udp        TimeFlies
#                               Doug Kent <mouthers@slugg@nwnexus.wa.com>
ndm-requester   1363/tcp        Network DataMover Requester
ndm-requester   1363/udp        Network DataMover Requester
ndm-server      1364/tcp        Network DataMover Server
ndm-server      1364/udp        Network DataMover Server
#                               Toshio Watanabe
#                               <watanabe@godzilla.rsc.spdd.ricoh.co.j>
adapt-sna       1365/tcp        Network Software Associates
adapt-sna       1365/udp        Network Software Associates
#                               Jeffery Chiao <714-768-401>
netware-csp     1366/tcp        Novell NetWare Comm Service Platform
netware-csp     1366/udp        Novell NetWare Comm Service Platform
#                               Laurie Lindsey <llindsey@novell.com>
dcs             1367/tcp        DCS
dcs             1367/udp        DCS
#                               Stefan Siebert <ssiebert@dcs.de>
screencast      1368/tcp        ScreenCast
screencast      1368/udp        ScreenCast
#                               Bill Tschumy <other!bill@uunet.UU.NET>
gv-us           1369/tcp        GlobalView to Unix Shell
gv-us           1369/udp        GlobalView to Unix Shell
us-gv           1370/tcp        Unix Shell to GlobalView
us-gv           1370/udp        Unix Shell to GlobalView
#               Makoto Mita <mita@ssdev.ksp.fujixerox.co.jp>
fc-cli          1371/tcp        Fujitsu Config Protocol
fc-cli          1371/udp        Fujitsu Config Protocol
fc-ser          1372/tcp        Fujitsu Config Protocol
fc-ser          1372/udp        Fujitsu Config Protocol
#               Ryuichi Horie <horie@spad.sysrap.cs.fujitsu.co.jp>
chromagrafx     1373/tcp        Chromagrafx
chromagrafx     1373/udp        Chromagrafx
#                               Mike Barthelemy <msb@chromagrafx.com>
molly           1374/tcp        EPI Software Systems
```

```
molly           1374/udp   EPI Software Systems
#                          Jim Vlcek <vlcek@epimbe.com>
bytex           1375/tcp   Bytex
bytex           1375/udp   Bytex
#               Mary Ann Burt <bytex!ws054!maryann@uunet.UU.NET>
ibm-pps         1376/tcp   IBM Person to Person Software
ibm-pps         1376/udp   IBM Person to Person Software
#                          Simon Phipps <sphipps@vnet.ibm.com>
cichlid         1377/tcp   Cichlid License Manager
cichlid         1377/udp   Cichlid License Manager
#                          Andy Burgess <aab@cichlid.com>
elan            1378/tcp   Elan License Manager
elan            1378/udp   Elan License Manager
#                          Ken Greer <kg@elan.com>
dbreporter      1379/tcp   Integrity Solutions
dbreporter      1379/udp   Integrity Solutions
#                          Tim Dawson <tdawson%mspboss@uunet.UU.NET>
telesis-licman  1380/tcp   Telesis Network License Manager
telesis-licman  1380/udp   Telesis Network License Manager
#                          Karl Schendel, Jr. <wiz@telesis.com>
apple-licman    1381/tcp   Apple Network License Manager
apple-licman    1381/udp   Apple Network License Manager
#                          Earl Wallace <earlw@apple.com>
udt_os          1382/tcp
udt_os          1382/udp
gwha            1383/tcp   GW Hannaway Network License Manager
gwha            1383/udp   GW Hannaway Network License Manager
#                          J. Gabriel Foster <fop@gwha.com>
os-licman       1384/tcp   Objective Solutions License Manager
os-licman       1384/udp   Objective Solutions License Manager
#               Donald Cornwell <don.cornwell@objective.com>
atex_elmd       1385/tcp   Atex Publishing License Manager
atex_elmd       1385/udp   Atex Publishing License Manager
#                          Brett Sorenson <bcs@atex.com>
checksum        1386/tcp   CheckSum License Manager
checksum        1386/udp   CheckSum License Manager
#                          Andreas Glocker <glocker@sirius.com>
cadsi-lm        1387/tcp   Computer Aided Design Software Inc LM
cadsi-lm        1387/udp   Computer Aided Design Software Inc LM
#                          Sulistio Muljadi
objective-dbc   1388/tcp   Objective Solutions DataBase Cache
objective-dbc   1388/udp   Objective Solutions DataBase Cache
#                          Donald Cornwell
iclpv-dm        1389/tcp   Document Manager
iclpv-dm        1389/udp   Document Manager
iclpv-sc        1390/tcp   Storage Controller
iclpv-sc        1390/udp   Storage Controller
iclpv-sas       1391/tcp   Storage Access Server
```

```
iclpv-sas       1391/udp   Storage Access Server
iclpv-pm        1392/tcp   Print Manager
iclpv-pm        1392/udp   Print Manager
iclpv-nls       1393/tcp   Network Log Server
iclpv-nls       1393/udp   Network Log Server
iclpv-nlc       1394/tcp   Network Log Client
iclpv-nlc       1394/udp   Network Log Client
iclpv-wsm       1395/tcp   PC Workstation Manager software
iclpv-wsm       1395/udp   PC Workstation Manager software
#               A.P. Hobson <A.P.Hobson@bra0112.wins.icl.co.uk>
dvl-activemail  1396/tcp   DVL Active Mail
dvl-activemail  1396/udp   DVL Active Mail
audio-activmail 1397/tcp   Audio Active Mail
audio-activmail 1397/udp   Audio Active Mail
video-activmail 1398/tcp   Video Active Mail
video-activmail 1398/udp   Video Active Mail
#                          Ehud Shapiro <udi@wisdon.weizmann.ac.il>
cadkey-licman   1399/tcp   Cadkey License Manager
cadkey-licman   1399/udp   Cadkey License Manager
cadkey-tablet   1400/tcp   Cadkey Tablet Daemon
cadkey-tablet   1400/udp   Cadkey Tablet Daemon
#                          Joe McCollough <joe@cadkey.com>
goldleaf-licman 1401/tcp   Goldleaf License Manager
goldleaf-licman 1401/udp   Goldleaf License Manager
#                          John Fox <---none--->
prm-sm-np       1402/tcp   Prospero Resource Manager
prm-sm-np       1402/udp   Prospero Resource Manager
prm-nm-np       1403/tcp   Prospero Resource Manager
prm-nm-np       1403/udp   Prospero Resource Manager
#                          B. Clifford Neuman <bcn@isi.edu>
igi-lm          1404/tcp   Infinite Graphics License Manager
igi-lm          1404/udp   Infinite Graphics License Manager
ibm-res         1405/tcp   IBM Remote Execution Starter
ibm-res         1405/udp   IBM Remote Execution Starter
netlabs-lm      1406/tcp   NetLabs License Manager
netlabs-lm      1406/udp   NetLabs License Manager
dbsa-lm         1407/tcp   DBSA License Manager
dbsa-lm         1407/udp   DBSA License Manager
#                          Scott Shattuck <ss@dbsa.com>
sophia-lm       1408/tcp   Sophia License Manager
sophia-lm       1408/udp   Sophia License Manager
#                          Eric Brown <sst!emerald!eric@uunet.UU.net>
here-lm         1409/tcp   Here License Manager
here-lm         1409/udp   Here License Manager
#                          David Ison  <here@dialup.oar.net>
hiq             1410/tcp   HiQ License Manager
hiq             1410/udp   HiQ License Manager
#                          Rick Pugh <rick@bilmillennium.com>
```

```
af              1411/tcp   AudioFile
af              1411/udp   AudioFile
#                          Jim Gettys <jg@crl.dec.com>
innosys         1412/tcp   InnoSys
innosys         1412/udp   InnoSys
innosys-acl     1413/tcp   Innosys-ACL
innosys-acl     1413/udp   Innosys-ACL
#                          Eric Welch <--none--->
ibm-mqseries    1414/tcp   IBM MQSeries
ibm-mqseries    1414/udp   IBM MQSeries
#                          Roger Meli <rmmeli%winvmd@vnet.ibm.com>
dbstar          1415/tcp   DBStar
dbstar          1415/udp   DBStar
#                          Jeffrey Millman <jcm@dbstar.com>
novell-lu6.2    1416/tcp   Novell LU6.2
novell-lu6.2    1416/udp   Novell LU6.2
#                          Peter Liu <--none--->
timbuktu-srv1   1417/tcp   Timbuktu Service 1 Port
timbuktu-srv1   1417/tcp   Timbuktu Service 1 Port
timbuktu-srv2   1418/tcp   Timbuktu Service 2 Port
timbuktu-srv2   1418/udp   Timbuktu Service 2 Port
timbuktu-srv3   1419/tcp   Timbuktu Service 3 Port
timbuktu-srv3   1419/udp   Timbuktu Service 3 Port
timbuktu-srv4   1420/tcp   Timbuktu Service 4 Port
timbuktu-srv4   1420/udp   Timbuktu Service 4 Port
#                          Marc Epard <marc@waygate.farallon.com>
gandalf-lm      1421/tcp   Gandalf License Manager
gandalf-lm      1421/udp   Gandalf License Manager
#                          gilmer@gandalf.ca
autodesk-lm     1422/tcp   Autodesk License Manager
autodesk-lm     1422/udp   Autodesk License Manager
#                          David Ko <dko@autodesk.com>
essbase         1423/tcp   Essbase Arbor Software
essbase         1423/udp   Essbase Arbor Software
hybrid          1424/tcp   Hybrid Encryption Protocol
hybrid          1424/udp   Hybrid Encryption Protocol
#                          Howard Hart <hch@hybrid.com>
zion-lm         1425/tcp   Zion Software License Manager
zion-lm         1425/udp   Zion Software License Manager
#                          David Ferrero <david@zion.com>
sas-1           1426/tcp   Satellite-data Acquisition System 1
sas-1           1426/udp   Satellite-data Acquisition System 1
#                          Bill Taylor <sais@ssec.wisc.edu>
mloadd          1427/tcp   mloadd monitoring tool
mloadd          1427/udp   mloadd monitoring tool
#                          Bob Braden <braden@isi.edu>
informatik-lm   1428/tcp   Informatik License Manager
informatik-lm   1428/udp   Informatik License Manager
```

```
#                               Harald Schlangmann
#                               <schlangm@informatik.uni-muenchen.de>
nms             1429/tcp        Hypercom NMS
nms             1429/udp        Hypercom NMS
tpdu            1430/tcp        Hypercom TPDU
tpdu            1430/udp        Hypercom TPDU
#                               Noor Chowdhury <noor@hypercom.com>
rgtp            1431/tcp        Reverse Gosip Transport
rgtp            1431/udp        Reverse Gosip Transport
#                               <iwj10@cl.cam-orl.co.uk>
blueberry-lm    1432/tcp        Blueberry Software License Manager
blueberry-lm    1432/udp        Blueberry Software License Manager
#                               Steve Beigel <ublueb!steve@uunet.uu.net>
ms-sql-s        1433/tcp        Microsoft-SQL-Server
ms-sql-s        1433/udp        Microsoft-SQL-Server
ms-sql-m        1434/tcp        Microsoft-SQL-Monitor
ms-sql-m        1434/udp        Microsoft-SQL-Monitor
#                               Peter Hussey <peterhus@microsoft.com>
ibm-cics        1435/tcp        IBM CISC
ibm-cics        1435/udp        IBM CISC
#                               Geoff Meacock <gbibmswl@ibmmail.COM>
sas-2           1436/tcp        Satellite-data Acquisition System 2
sas-2           1436/udp        Satellite-data Acquisition System 2
#                               Bill Taylor <sais@ssec.wisc.edu>
tabula          1437/tcp        Tabula
tabula          1437/udp        Tabula
#                               Marcelo Einhorn
#                               <KGUNE%HUJIVM1.bitnet@taunivm.tau.ac.il>
eicon-server    1438/tcp        Eicon Security Agent/Server
eicon-server    1438/udp        Eicon Security Agent/Server
eicon-x25       1439/tcp        Eicon X25/SNA Gateway
eicon-x25       1439/udp        Eicon X25/SNA Gateway
eicon-slp       1440/tcp        Eicon Service Location Protocol
eicon-slp       1440/udp        Eicon Service Location Protocol
#                               Pat Calhoun <CALHOUN@admin.eicon.qc.ca>
cadis-1         1441/tcp        Cadis License Management
cadis-1         1441/udp        Cadis License Management
cadis-2         1442/tcp        Cadis License Management
cadis-2         1442/udp        Cadis License Management
#                               Todd Wichers <twichers@csn.org>
ies-lm          1443/tcp        Integrated Engineering Software
ies-lm          1443/udp        Integrated Engineering Software
#                               David Tong <David_Tong@integrated.mb.ca>
marcam-lm       1444/tcp        Marcam  License Management
marcam-lm       1444/udp        Marcam  License Management
#                               Therese Hunt <hunt@marcam.com>
proxima-lm      1445/tcp        Proxima License Manager
proxima-lm      1445/udp        Proxima License Manager
```

```
ora-lm          1446/tcp   Optical Research Associates License Manager
ora-lm          1446/udp   Optical Research Associates License Manager
apri-lm         1447/tcp   Applied Parallel Research LM
apri-lm         1447/udp   Applied Parallel Research LM
#                          Jim Dillon <jed@apri.com>
oc-lm           1448/tcp   OpenConnect License Manager
oc-lm           1448/udp   OpenConnect License Manager
#                          Sue Barnhill <snb@oc.com>
peport          1449/tcp   PEport
peport          1449/udp   PEport
#                          Qentin Neill <quentin@ColumbiaSC.NCR.COM>
dwf             1450/tcp   Tandem Distributed Workbench Facility
dwf             1450/udp   Tandem Distributed Workbench Facility
#                          Mike Bert <BERG_MIKE@tandem.com>
infoman         1451/tcp   IBM Information Management
infoman         1451/udp   IBM Information Management
#                          Karen Burns <---none--->
gtegsc-lm       1452/tcp   GTE Government Systems License Man
gtegsc-lm       1452/udp   GTE Government Systems License Man
#               Mike Gregory <Gregory_Mike@msmail.iipo.gtegsc.com>
genie-lm        1453/tcp   Genie License Manager
genie-lm        1453/udp   Genie License Manager
#                          Paul Applegate <p.applegate2@genie.geis.com>
interhdl_elmd   1454/tcp   interHDL License Manager
interhdl_elmd   1454/tcp   interHDL License Manager
#                          Eli Sternheim eli@interhdl.com
esl-lm          1455/tcp   ESL License Manager
esl-lm          1455/udp   ESL License Manager
#                          Abel Chou <abel@willy.esl.com>
dca             1456/tcp   DCA
dca             1456/udp   DCA
#                          Jeff Garbers <jgarbers@netcom.com>
valisys-lm      1457/tcp    Valisys License Manager
valisys-lm      1457/udp    Valisys License Manager
#               Leslie Lincoln <leslie_lincoln@valisys.com>
nrcabq-lm       1458/tcp    Nichols Research Corp.
nrcabq-lm       1458/udp    Nichols Research Corp.
#                           Howard Cole <hcole@tumbleweed.nrcabq.com>
proshare1       1459/tcp    Proshare Notebook Application
proshare1       1459/udp    Proshare Notebook Application
proshare2       1460/tcp    Proshare Notebook Application
proshare2       1460/udp    Proshare Notebook Application
#                           Robin Kar <Robin_Kar@ccm.hf.intel.com>
ibm_wrless_lan  1461/tcp    IBM Wireless LAN
ibm_wrless_lan  1461/udp    IBM Wireless LAN
#                           <flanne@vnet.IBM.COM>
world-lm        1462/tcp    World License Manager
world-lm        1462/udp    World License Manager
```

```
#                               Michael S Amirault <ambi@world.std.com>
nucleus         1463/tcp        Nucleus
nucleus         1463/udp        Nucleus
#                               Venky Nagar <venky@fafner.Stanford.EDU>
msl_lmd         1464/tcp        MSL License Manager
msl_lmd         1464/udp        MSL License Manager
#                               Matt Timmermans
pipes           1465/tcp        Pipes Platform
pipes           1465/udp        Pipes Platform  mfarlin@peerlogic.com
#                               Mark Farlin <mfarlin@peerlogic.com>
oceansoft-lm    1466/tcp        Ocean Software License Manager
oceansoft-lm    1466/udp        Ocean Software License Manager
#                               Randy Leonard <randy@oceansoft.com>
csdmbase        1467/tcp        CSDMBASE
csdmbase        1467/udp        CSDMBASE
csdm            1468/tcp        CSDM
csdm            1468/udp        CSDM
#               Robert Stabl <stabl@informatik.uni-muenchen.de>
aal-lm          1469/tcp        Active Analysis Limited License Manager
aal-lm          1469/udp        Active Analysis Limited License Manager
#                               David Snocken  +44 (71)437-7009
uaiact          1470/tcp        Universal Analytics
uaiact          1470/udp        Universal Analytics
#                               Mark R. Ludwig <Mark-Ludwig@uai.com>
csdmbase        1471/tcp        csdmbase
csdmbase        1471/udp        csdmbase
csdm            1472/tcp        csdm
csdm            1472/udp        csdm
#               Robert Stabl <stabl@informatik.uni-muenchen.de>
openmath        1473/tcp        OpenMath
openmath        1473/udp        OpenMath
#                               Garth Mayville <mayville@maplesoft.on.ca>
telefinder      1474/tcp        Telefinder
telefinder      1474/udp        Telefinder
#                               Jim White <Jim_White@spiderisland.com>
taligent-lm     1475/tcp        Taligent License Manager
taligent-lm     1475/udp        Taligent License Manager
#               Mark Sapsford <Mark_Sapsford@@taligent.com>
clvm-cfg        1476/tcp        clvm-cfg
clvm-cfg        1476/udp        clvm-cfg
#                               Eric Soderberg <seric@cup.hp.com>
ms-sna-server   1477/tcp        ms-sna-server
ms-sna-server   1477/udp        ms-sna-server
ms-sna-base     1478/tcp        ms-sna-base
ms-sna-base     1478/udp        ms-sna-base
#                               Gordon Mangione <gordm@microsoft.com>
dberegister     1479/tcp        dberegister
dberegister     1479/udp        dberegister
```

```
#                               Brian Griswold <brian@dancingbear.com>
pacerforum      1480/tcp        PacerForum
pacerforum      1480/udp        PacerForum
#                               Peter Caswell <pfc@pacvax.pacersoft.com>
airs            1481/tcp        AIRS
airs            1481/udp        AIRS
#                               Bruce Wilson, 905-771-6161
miteksys-lm     1482/tcp        Miteksys License Manager
miteksys-lm     1482/udp        Miteksys License Manager
#                               Shane McRoberts <mcroberts@miteksys.com>
afs             1483/tcp        AFS License Manager
afs             1483/udp        AFS License Manager
#                               Michael R. Pizolato <michael@afs.com>
confluent       1484/tcp        Confluent License Manager
confluent       1484/udp        Confluent License Manager
#                               James Greenfiel <jim@pa.confluent.com>
lansource       1485/tcp        LANSource
lansource       1485/udp        LANSource
#                               Doug Scott <lansourc@hookup.net>
nms_topo_serv   1486/tcp        nms_topo_serv
nms_topo_serv   1486/udp        nms_topo_serv
#                               Sylvia Siu <Sylvia_Siu@Novell.CO>
localinfosrvr   1487/tcp        LocalInfoSrvr
localinfosrvr   1487/udp        LocalInfoSrvr
#               Brian Matthews <brian_matthews@ibist.ibis.com>
docstor         1488/tcp        DocStor
docstor         1488/udp        DocStor
#                               Brian Spears <bspears@salix.com>
dmdocbroker     1489/tcp        dmdocbroker
dmdocbroker     1489/udp        dmdocbroker
#                               Razmik Abnous <abnous@documentum.com>
insitu-conf     1490/tcp        insitu-conf
insitu-conf     1490/udp        insitu-conf
#                               Paul Blacknell <paul@insitu.com>
anynetgateway   1491/tcp        anynetgateway
anynetgateway   1491/udp        anynetgateway
#                               Dan Poirier <poirier@VNET.IBM.COM>
stone-design-1  1492/tcp        stone-design-1
stone-design-1  1492/udp        stone-design-1
#                               Andrew Stone <andrew@stone.com>
netmap_lm       1493/tcp        netmap_lm
netmap_lm       1493/udp        netmap_lm
#                               Phillip Magson <philm@extro.ucc.su.OZ.AU>
ica             1494/tcp        ica
ica             1494/udp        ica
#                               John Richardson, Citrix Systems
cvc             1495/tcp        cvc
cvc             1495/udp        cvc
```

```
#                                   Bill Davidson <billd@equalizer.cray.com>
liberty-lm      1496/tcp    liberty-lm
liberty-lm      1496/udp    liberty-lm
#                                   Jim Rogers <trane!jimbo@pacbell.com>
rfx-lm          1497/tcp    rfx-lm
rfx-lm          1497/udp    rfx-lm
#                                   Bill Bishop <bil@rfx.rfx.com>
watcom-sql      1498/tcp    Watcom-SQL
watcom-sql      1498/udp    Watcom-SQL
#                                   Rog Skubowius <rwskubow@ccnga.uwaterloo.ca>
fhc             1499/tcp    Federico Heinz Consultora
fhc             1499/udp    Federico Heinz Consultora
#                                   Federico Heinz <federico@heinz.com>
vlsi-lm         1500/tcp    VLSI License Manager
vlsi-lm         1500/udp    VLSI License Manager
#                                   Shue-Lin Kuo <shuelin@mdk.sanjose.vlsi.com>
sas-3           1501/tcp    Satellite-data Acquisition System 3
sas-3           1501/udp    Satellite-data Acquisition System 3
#                                   Bill Taylor <sais@ssec.wisc.edu>
shivadiscovery  1502/tcp    Shiva
shivadiscovery  1502/udp    Shiva
#                                   Jonathan Wenocur <jhw@Shiva.COM>
imtc-mcs        1503/tcp    Databeam
imtc-mcs        1503/udp    Databeam
#                                   Jim Johnstone <jjohnstone@databeam.com>
evb-elm         1504/tcp    EVB Software Engineering License Manager
evb-elm         1504/udp    EVB Software Engineering License Manager
#                                   B.G. Mahesh < mahesh@sett.com>
funkproxy       1505/tcp    Funk Software, Inc.
funkproxy       1505/udp    Funk Software, Inc.
#                                   Robert D. Vincent <bert@willowpond.com>
#               1506-1523   Unassigned
ingreslock      1524/tcp    ingres
ingreslock      1524/udp    ingres
orasrv          1525/tcp    oracle
orasrv          1525/udp    oracle
prospero-np     1525/tcp    Prospero Directory Service non-priv
prospero-np     1525/udp    Prospero Directory Service non-priv
pdap-np         1526/tcp    Prospero Data Access Prot non-priv
pdap-np         1526/udp    Prospero Data Access Prot non-priv
#                                   B. Clifford Neuman <bcn@isi.edu>
tlisrv          1527/tcp    oracle
tlisrv          1527/udp    oracle
coauthor        1529/tcp    oracle
coauthor        1529/udp    oracle
issd            1600/tcp
issd            1600/udp
nkd             1650/tcp
```

```
nkd             1650/udp
proshareaudio   1651/tcp   proshare conf audio
proshareaudio   1651/udp   proshare conf audio
prosharevideo   1652/tcp   proshare conf video
prosharevideo   1652/udp   proshare conf video
prosharedata    1653/tcp   proshare conf data
prosharedata    1653/udp   proshare conf data
prosharerequest 1654/tcp   proshare conf request
prosharerequest 1654/udp   proshare conf request
prosharenotify  1655/tcp   proshare conf notify
prosharenotify  1655/udp   proshare conf notify
#                          <gunner@ibeam.intel.com>
netview-aix-1   1661/tcp   netview-aix-1
netview-aix-1   1661/udp   netview-aix-1
netview-aix-2   1662/tcp   netview-aix-2
netview-aix-2   1662/udp   netview-aix-2
netview-aix-3   1663/tcp   netview-aix-3
netview-aix-3   1663/udp   netview-aix-3
netview-aix-4   1664/tcp   netview-aix-4
netview-aix-4   1664/udp   netview-aix-4
netview-aix-5   1665/tcp   netview-aix-5
netview-aix-5   1665/udp   netview-aix-5
netview-aix-6   1666/tcp   netview-aix-6
netview-aix-6   1666/udp   netview-aix-6
#               Martha Crisson <CRISSON@ralvm12.vnet.ibm.com>
licensedaemon   1986/tcp   cisco license management
licensedaemon   1986/udp   cisco license management
tr-rsrb-p1      1987/tcp   cisco RSRB Priority 1 port
tr-rsrb-p1      1987/udp   cisco RSRB Priority 1 port
tr-rsrb-p2      1988/tcp   cisco RSRB Priority 2 port
tr-rsrb-p2      1988/udp   cisco RSRB Priority 2 port
tr-rsrb-p3      1989/tcp   cisco RSRB Priority 3 port
tr-rsrb-p3      1989/udp   cisco RSRB Priority 3 port
#PROBLEMS!==================================================
mshnet          1989/tcp   MHSnet system
mshnet          1989/udp   MHSnet system
#               Bob Kummerfeld <bob@sarad.cs.su.oz.au>
#PROBLEMS!==================================================
stun-p1         1990/tcp   cisco STUN Priority 1 port
stun-p1         1990/udp   cisco STUN Priority 1 port
stun-p2         1991/tcp   cisco STUN Priority 2 port
stun-p2         1991/udp   cisco STUN Priority 2 port
stun-p3         1992/tcp   cisco STUN Priority 3 port
stun-p3         1992/udp   cisco STUN Priority 3 port
#PROBLEMS!==================================================
ipsendmsg       1992/tcp   IPsendmsg
ipsendmsg       1992/udp   IPsendmsg
#               Bob Kummerfeld <bob@sarad.cs.su.oz.au>
```

```
#PROBLEMS!==================================================
snmp-tcp-port   1993/tcp   cisco SNMP TCP port
snmp-tcp-port   1993/udp   cisco SNMP TCP port
stun-port       1994/tcp   cisco serial tunnel port
stun-port       1994/udp   cisco serial tunnel port
perf-port       1995/tcp   cisco perf port
perf-port       1995/udp   cisco perf port
tr-rsrb-port    1996/tcp   cisco Remote SRB port
tr-rsrb-port    1996/udp   cisco Remote SRB port
gdp-port        1997/tcp   cisco Gateway Discovery Protocol
gdp-port        1997/udp   cisco Gateway Discovery Protocol
x25-svc-port    1998/tcp   cisco X.25 service (XOT)
x25-svc-port    1998/udp   cisco X.25 service (XOT)
tcp-id-port     1999/tcp   cisco identification port
tcp-id-port     1999/udp   cisco identification port
callbook        2000/tcp
callbook        2000/udp
dc              2001/tcp
wizard          2001/udp    curry
globe           2002/tcp
globe           2002/udp
mailbox         2004/tcp
emce            2004/udp    CCWS mm conf
berknet         2005/tcp
oracle          2005/udp
invokator       2006/tcp
raid-cc         2006/udp    raid
dectalk         2007/tcp
raid-am         2007/udp
conf            2008/tcp
terminaldb      2008/udp
news            2009/tcp
whosockami      2009/udp
search          2010/tcp
pipe_server     2010/udp
raid-cc         2011/tcp    raid
servserv        2011/udp
ttyinfo         2012/tcp
raid-ac         2012/udp
raid-am         2013/tcp
raid-cd         2013/udp
troff           2014/tcp
raid-sf         2014/udp
cypress         2015/tcp
raid-cs         2015/udp
bootserver      2016/tcp
bootserver      2016/udp
cypress-stat    2017/tcp
```

```
bootclient      2017/udp
terminaldb      2018/tcp
rellpack        2018/udp
whosockami      2019/tcp
about           2019/udp
xinupageserver  2020/tcp
xinupageserver  2020/udp
servexec        2021/tcp
xinuexpansion1  2021/udp
down            2022/tcp
xinuexpansion2  2022/udp
xinuexpansion3  2023/tcp
xinuexpansion3  2023/udp
xinuexpansion4  2024/tcp
xinuexpansion4  2024/udp
ellpack         2025/tcp
xribs           2025/udp
scrabble        2026/tcp
scrabble        2026/udp
shadowserver    2027/tcp
shadowserver    2027/udp
submitserver    2028/tcp
submitserver    2028/udp
device2         2030/tcp
device2         2030/udp
blackboard      2032/tcp
blackboard      2032/udp
glogger         2033/tcp
glogger         2033/udp
scoremgr        2034/tcp
scoremgr        2034/udp
imsldoc         2035/tcp
imsldoc         2035/udp
objectmanager   2038/tcp
objectmanager   2038/udp
lam             2040/tcp
lam             2040/udp
interbase       2041/tcp
interbase       2041/udp
isis            2042/tcp
isis            2042/udp
isis-bcast      2043/tcp
isis-bcast      2043/udp
rimsl           2044/tcp
rimsl           2044/udp
cdfunc          2045/tcp
cdfunc          2045/udp
sdfunc          2046/tcp
```

```
sdfunc          2046/udp
dls             2047/tcp
dls             2047/udp
dls-monitor     2048/tcp
dls-monitor     2048/udp
shilp           2049/tcp
shilp           2049/udp
dlsrpn          2065/tcp   Data Link Switch Read Port Number
dlsrpn          2065/udp   Data Link Switch Read Port Number
dlswpn          2067/tcp   Data Link Switch Write Port Number
dlswpn          2067/udp   Data Link Switch Write Port Number
ats             2201/tcp   Advanced Training System Program
ats             2201/udp   Advanced Training System Program
rtsserv         2500/tcp   Resource Tracking system server
rtsserv         2500/udp   Resource Tracking system server
rtsclient       2501/tcp   Resource Tracking system client
rtsclient       2501/udp   Resource Tracking system client
#                          Aubrey Turner
#               <S95525ta%etsuacad.bitnet@ETSUADMN.ETSU.EDU>
hp-3000-telnet  2564/tcp   HP 3000 NS/VT block mode telnet
www-dev         2784/tcp   world wide web - development
www-dev         2784/udp   world wide web - development
NSWS            3049/tcp
NSWS            3049/udp
ccmail          3264/tcp   cc:mail/lotus
ccmail          3264/udp   cc:mail/lotus
dec-notes       3333/tcp   DEC Notes
dec-notes       3333/udp   DEC Notes
#                          Kim Moraros <moraros@via.enet.dec.com>
mapper-nodemgr    3984/tcp     MAPPER network node manager
mapper-nodemgr    3984/udp     MAPPER network node manager
mapper-mapethd    3985/tcp     MAPPER TCP/IP server
mapper-mapethd    3985/udp     MAPPER TCP/IP server
mapper-ws_ethd    3986/tcp     MAPPER workstation server
mapper-ws_ethd    3986/udp     MAPPER workstation server
#                 John C. Horton <jch@unirsvl.rsvl.unisys.com>
bmap            3421/tcp   Bull Apprise portmapper
bmap            3421/udp   Bull Apprise portmapper
#                          Jeremy Gilbert <J.Gilbert@ma30.bull.com>
udt_os          3900/tcp   Unidata UDT OS
udt_os          3900/udp   Unidata UDT OS
#                          James Powell <james@mailhost.unidata.com>
nuts_dem        4132/tcp   NUTS Daemon
nuts_dem        4132/udp   NUTS Daemon
nuts_bootp      4133/tcp   NUTS Bootp Server
nuts_bootp      4133/udp   NUTS Bootp Server
#                          Martin Freiss <freiss.pad@sni.>
unicall         4343/tcp   UNICALL
```

```
unicall         4343/udp   UNICALL
#                          James Powell <james@enghp.unidata.comp>
krb524          4444/tcp   KRB524
krb524          4444/udp   KRB524
#                          B. Clifford Neuman <bcn@isi.edu>
rfa             4672/tcp   remote file access server
rfa             4672/udp   remote file access server
commplex-main   5000/tcp
commplex-main   5000/udp
commplex-link   5001/tcp
commplex-link   5001/udp
rfe             5002/tcp   radio free ethernet
rfe             5002/udp   radio free ethernet
telelpathstart  5010/tcp   TelepathStart
telelpathstart  5010/udp   TelepathStart
telelpathattack 5011/tcp   TelepathAttack
telelpathattack 5011/udp   TelepathAttack
#               Helmuth Breitenfellner <hbreitenf@vnet.imb.com>
mmcc            5050/tcp   multimedia conference control tool
mmcc            5050/udp   multimedia conference control tool
rmonitor_secure 5145/tcp
rmonitor_secure 5145/udp
aol             5190/tcp   America-Online
aol             5190/udp   America-Online
#                          Marty Lyons <marty@aol.com>
padl2sim        5236/tcp
padl2sim        5236/udp
hacl-hb         5300/tcp        # HA cluster heartbeat
hacl-hb         5300/udp        # HA cluster heartbeat
hacl-gs         5301/tcp        # HA cluster general services
hacl-gs         5301/udp        # HA cluster general services
hacl-cfg        5302/tcp        # HA cluster configuration
hacl-cfg        5302/udp        # HA cluster configuration
hacl-probe      5303/tcp        # HA cluster probing
hacl-probe      5303/udp        # HA cluster probing
hacl-local      5304/tcp
hacl-local      5304/udp
hacl-test       5305/tcp
hacl-test       5305/udp
#                          Eric Soderberg <seric@hposl102.cup.hp>
x11             6000-6063/tcp   X Window System
x11             6000-6063/udp   X Window System
#               Stephen Gildea <gildea@expo.lcs.mit.edu>
sub-process     6111/tcp   HP SoftBench Sub-Process Control
sub-process     6111/udp   HP SoftBench Sub-Process Control
meta-corp       6141/tcp   Meta Corporation License Manager
meta-corp       6141/udp   Meta Corporation License Manager
#                          Osamu Masuda <--none--->
```

```
aspentec-lm     6142/tcp   Aspen Technology License Manager
aspentec-lm     6142/udp   Aspen Technology License Manager
#                          Kevin Massey <massey@aspentec.com>
watershed-lm    6143/tcp   Watershed License Manager
watershed-lm    6143/udp   Watershed License Manager
#                          David Ferrero <david@zion.com>
statsci1-lm     6144/tcp   StatSci License Manager - 1
statsci1-lm     6144/udp   StatSci License Manager - 1
statsci2-lm     6145/tcp   StatSci License Manager - 2
statsci2-lm     6145/udp   StatSci License Manager - 2
#                          Scott Blachowicz <scott@statsci.com>
lonewolf-lm     6146/tcp   Lone Wolf Systems License Manager
lonewolf-lm     6146/udp   Lone Wolf Systems License Manager
#                          Dan Klein <dvk@lonewolf.com>
montage-lm      6147/tcp   Montage License Manager
montage-lm      6147/udp   Montage License Manager
#                          Michael Ubell <michael@montage.com>
xdsxdm          6558/udp
xdsxdm          6558/tcp
afs3-fileserver 7000/tcp   file server itself
afs3-fileserver 7000/udp   file server itself
afs3-callback   7001/tcp   callbacks to cache managers
afs3-callback   7001/udp   callbacks to cache managers
afs3-prserver   7002/tcp   users & groups database
afs3-prserver   7002/udp   users & groups database
afs3-vlserver   7003/tcp   volume location database
afs3-vlserver   7003/udp   volume location database
afs3-kaserver   7004/tcp   AFS/Kerberos authentication service
afs3-kaserver   7004/udp   AFS/Kerberos authentication service
afs3-volser     7005/tcp   volume managment server
afs3-volser     7005/udp   volume managment server
afs3-errors     7006/tcp   error interpretation service
afs3-errors     7006/udp   error interpretation service
afs3-bos        7007/tcp   basic overseer process
afs3-bos        7007/udp   basic overseer process
afs3-update     7008/tcp   server-to-server updater
afs3-update     7008/udp   server-to-server updater
afs3-rmtsys     7009/tcp   remote cache manager service
afs3-rmtsys     7009/udp   remote cache manager service
ups-onlinet     7010/tcp   onlinet uninterruptable power supplies
ups-onlinet     7010/udp   onlinet uninterruptable power supplies
#                          Brian Hammill <hamill@dolphin.exide.com>
font-service    7100/tcp   X Font Service
font-service    7100/udp   X Font Service
#                          Stephen Gildea <gildea@expo.lcs.mit.edu>
fodms           7200/tcp   FODMS FLIP
fodms           7200/udp   FODMS FLIP
#           David Anthony <anthony@power.amasd.anatcp.rockwell.com>
```

```
man             9535/tcp
man             9535/udp
isode-dua       17007/tcp
isode-dua       17007/udp
```

REFERENCES

[RFC768] Postel, J., "User Datagram Protocol", STD 6, RFC 768, USC/Information Sciences Institute, August 1980.

[RFC793] Postel, J., ed., "Transmission Control Protocol - DARPA Internet Program Protocol Specification", STD 7, RFC 793, USC/Information Sciences Institute, September 1981.

[]

URL = ftp://ftp.isi.edu/in-notes/iana/assignments/port-numbers

INTERNET MULTICAST ADDRESSES

Host Extensions for IP Multicasting [RFC1112] specifies the extensions required of a host implementation of the Internet Protocol (IP) to support multicasting. Current addresses are listed below.

224.0.0.0	Base Address (Reserved)	[RFC1112,JBP]
224.0.0.1	All Systems on this Subnet	[RFC1112,JBP]
224.0.0.2	All Routers on this Subnet	[JBP]
224.0.0.3	Unassigned	[JBP]
224.0.0.4	DVMRP Routers	[RFC1075,JBP]
224.0.0.5	OSPFIGP OSPFIGP All Routers	[RFC1583,JXM1]
224.0.0.6	OSPFIGP OSPFIGP Designated Routers	[RFC1583,JXM1]
224.0.0.7	ST Routers	[RFC1190,KS14]
224.0.0.8	ST Hosts	[RFC1190,KS14]
224.0.0.9	RIP2 Routers	[GSM11]
224.0.0.10	IGRP Routers	[Dino Farinacci]
224.0.0.11	Mobile-Agents	[Bill Simpson]
224.0.0.12-224.0.0.255	Unassigned	[JBP]
224.0.1.0	VMTP Managers Group	[RFC1045,DRC3]
224.0.1.1	NTP Network Time Protocol	[RFC1119,DLM1]
224.0.1.2	SGI-Dogfight	[AXC]
224.0.1.3	Rwhod	[SXD]
224.0.1.4	VNP	[DRC3]
224.0.1.5	Artificial Horizons - Aviator	[BXF]
224.0.1.6	NSS - Name Service Server	[BXS2]
224.0.1.7	AUDIONEWS - Audio News Multicast	[MXF2]
224.0.1.8	SUN NIS+ Information Service	[CXM3]
224.0.1.9	MTP Multicast Transport Protocol	[SXA]
224.0.1.10	IETF-1-LOW-AUDIO	[SC3]
224.0.1.11	IETF-1-AUDIO	[SC3]
224.0.1.12	IETF-1-VIDEO	[SC3]
224.0.1.13	IETF-2-LOW-AUDIO	[SC3]
224.0.1.14	IETF-2-AUDIO	[SC3]
224.0.1.15	IETF-2-VIDEO	[SC3]
224.0.1.16	MUSIC-SERVICE	[Guido van Rossum]
224.0.1.17	SEANET-TELEMETRY	[Andrew Maffei]
224.0.1.18	SEANET-IMAGE	[Andrew Maffei]
224.0.1.19	MLOADD	[Braden]
224.0.1.20	any private experiment	[JBP]
224.0.1.21	DVMRP on MOSPF	[John Moy]
224.0.1.22	SVRLOC	<veizades@ftp.com>
224.0.1.23	XINGTV	<hgxing@aol.com>
224.0.1.24	microsoft-ds	<arnoldm@microsoft.com>
224.0.1.25	nbc-pro	<bloomer@birch.crd.ge.com>
224.0.1.26	nbc-pfn	<bloomer@birch.crd.ge.com>
224.0.1.27-224.0.1.255	Unassigned	[JBP]

```
224.0.2.1  "rwho" Group (BSD) (unofficial)                    [JBP]
224.0.2.2  SUN RPC PMAPPROC_CALLIT                           [BXE1]

224.0.3.000-224.0.3.255 RFE Generic Service                  [DXS3]
224.0.4.000-224.0.4.255 RFE Individual Conferences           [DXS3]
224.0.5.000-224.0.5.127 CDPD Groups                   [Bob Brenner]
224.0.5.128-224.0.5.255 Unassigned                           [IANA]
224.0.6.000-224.0.6.127 Cornell ISIS Project            [Tim Clark]
224.0.6.128-224.0.6.255 Unassigned                           [IANA]

224.1.0.0-224.1.255.255  ST Multicast Groups         [RFC1190,KS14]
224.2.0.0-224.2.255.255  Multimedia Conference Calls          [SC3]

224.252.0.0-224.255.255.255 DIS transient groups      [Joel Snyder]

232.0.0.0-232.255.255.255  VMTP transient groups     [RFC1045,DRC3]
```

These addresses are listed in the Domain Name Service under MCAST.NET and 224.IN-ADDR.ARPA.

Note that when used on an Ethernet or IEEE 802 network, the 23 low-order bits of the IP Multicast address are placed in the low-order 23 bits of the Ethernet or IEEE 802 net multicast address 1.0.94.0.0.0. See the next section on "IANA ETHERNET ADDRESS BLOCK".

REFERENCES

[RFC1045] Cheriton, D., "VMTP: Versatile Message Transaction Protocol Specification", RFC 1045, Stanford University, February 1988.

[RFC1075] Waitzman, D., C. Partridge, and S. Deering "Distance Vector Multicast Routing Protocol", RFC-1075, BBN STC, Stanford University, November 1988.

[RFC1112] Deering, S., "Host Extensions for IP Multicasting", STD 5, RFC 1112, Stanford University, August 1989.

[RFC1119] Mills, D., "Network Time Protocol (Version 1), Specification and Implementation", STD 12, RFC 1119, University of Delaware, July 1988.

[RFC1190] Topolcic, C., Editor, "Experimental Internet Stream Protocol, Version 2 (ST-II)", RFC 1190, CIP Working Group, October 1990.

[RFC1583] Moy, J., "The OSPF Specification", RFC 1583, Proteon, March 1994.

PEOPLE

<arnoldm@microsoft.com>

[AXC] Andrew Cherenson <arc@SGI.COM>

[Bob Brenner]

<bloomer@birch.crd.ge.com>

[Braden] Bob Braden <braden@isi.edu

[BXE1] Brendan Eic <brendan@illyria.wpd.sgi.com>

[BXF] Bruce Factor <ahi!bigapple!bruce@uunet.UU.NET>

[BXS2] Bill Schilit <schilit@parc.xerox.com>

[CXM3] Chuck McManis <cmcmanis@sun.com>

[Tim Clark]

[DLM1] David Mills <Mills@HUEY.UDEL.EDU>

[DRC3] Dave Cheriton <cheriton@PESCADERO.STANFORD.EDU>

[DXS3] Daniel Steinber <Daniel.Steinberg@Eng.Sun.COM>

[Dino Farinacci]

[GSM11] Gary S. Malkin <GMALKIN@XYLOGICS.COM>

<hgxing@aol.com>

[IANA] IANA <iana@isi.edu>

[JBP] Jon Postel <postel@isi.edu>

[JXM1] Jim Miner <miner@star.com>

[KS14] <mystery contact>

[Andrew Maffei]

[John Moy] John Moy <jmoy@PROTEON.COM>

[MXF2] Martin Forssen <maf@dtek.chalmers.se>

[Guido van Rossum]

[SC3] Steve Casner <casner@isi.edu>

[Joel Snyder]

[SXA] Susie Armstrong <Armstrong.wbst128@XEROX.COM>

[SXD] Steve Deering <deering@PARC.XEROX.COM>

<veizades@ftp.com>

[]

URL = ftp://ftp.isi.edu/in-notes/iana/assignments/multicast-addresses

SUN RPC NUMBERS

To obtain SUN Remote Procedure Call (RPC) numbers send an e-mail request to "rpc@sun.com".

The RPC port management service ('portmap' in SunOS versions less than 5.0 and 'rpcbind' in SunOS versions greater than 5.0) "registers" the IP port number that is allocated to a particular service when that service is created. It does not allocate ports on behalf of those services.

For an exact specification of the semantics refer to the source code of svcudp_create() and svctcp_create() in the archives. In short however is that these interfaces, and svc_tli_create their Transport Independent RPC equivalent, take either a user specified port number or RPC_ANY (-1) which effectively means "I don't care." In the "I don't care" case the create code simply calls socket(2) or t_open(3n) which allocates an IP port based on the rules:

```
if euid of the requesting process is 0 (i.e., root)
        allocate the next available port number in the
        reserved port range.
else
        allocate the next available port in the non-reserved
        range.
```

Port numbers count up sequentially.

Can a port that is "assigned" can be used when the assignee's service is not present? Say port 501 is assigned to the "jeans" service. On a machine that does not have the "jeans" service, nor has any clients that might be expecting to use it, is port 501 available for other uses? Any dynamic allocation process, like the portmapper, that chooses the next unused port might allocate port 501 dynamically to a process that asked for a "I don't care" port. So any dynamic allocation scheme may pick an unused port that happened to correspond to a port number that had been "assigned" but was currently unused.

While it might be desirable, it is impossible to guarantee that any unused port, even though officially assigned to a service, is not picked by a dynamic allocator since such an assignment might occur long after the delivery of the system into a site that doesn't watch for the latest list.

There is the restriction that only "superuser" on BSD derived systems such as SunOS can bind to a port number that is less than 1024. So programs have used this information in the past to identify whether or

not the service they were talking to was started by the superuser on the remote system. Making this assumption is dangerous because not all system enforce this restriction.

Sun RPC services use ports that are currently unused. If someone noted that an RPC service was using port 781, it would be just as happy using port 891, or 951. The service doesn't care what port it gets, remote clients will query the portmapper to ask it what port number was assigned to the service when it was started. The key is that the port was not currently in use. The only port that ONC/RPC must have is 111 its assigned port for the portmap service.

The most common complaint comes when people put a new service on their system. When they configure their systems they put the new service configuration commands at the end of their system startup scripts. During startup, several network services may be started. Those services that are ONC/RPC based just pick the next available port, those that have pre-assigned ports bind to their pre-assigned port. Clearly the correct sequence is to have all services that need a particular port to be started first (or if they are "latent" services that are started by inetd, to have inetd started). Finally, the RPC services should be started as they will be assigned unused ports. (In the BSD networking code (which we use) the algorithm for picking ports is in the file in_pcb.c, function in_pcbbind().)

Services should be started in this order:

a) Services that will "run" continuously and have an assigned port. Note that this includes rpcbind (nee portmap) that has port 111 assigned to it.

b) inetd - which will automatically create sockets for those services that have reserved ports but only run on demand (like finger)

c) RPC services - which will automatically pick unused ports and maximize efficiency of the "IP Port" namespace.

The include file /usr/include/netinet/in.h defines a constant IPPORT_RESERVED to be 1024. The relevant text is:

```
/*
 * Ports < IPPORT_RESERVED are reserved for
 * privileged processes (e.g. root).
 * Ports > IPPORT_USERRESERVED are reserved
 * for servers, not necessarily privileged.
 */
#define IPPORT_RESERVED         1024
```

```
   #define IPPORT_USERRESERVED     5000
```

Portmap does not allocate ports, the kernel allocates ports. The code that does this is part of nearly every UNIX system in the world (and since the BSD code is 'free' it is often the same code). RPC services ask the kernel to allocate them a port by calling the "bind()" system call. The parameter they pass is "INADDR_ANY" which means "allocate me any IP port you want". The kernel does that by looking at all of the ports that are currently in use and picking one that is not currently used. The number picked is either less that 1024 if the process is privledged, or greater than 1024 if the process is not privledged. After the kernel has allocated a port, the service registers this allocation with portmap. The portmapper is merely a registry of previously allocated ports. Note "allocated" here is being used in the sense that they are used by an open socket, not assigned a well known name.

The role of /etc/services is to provide an idea to people who are looking at network traffic as to where a packet may have originated from or is headed to. For services like finger that have assigned ports, they can just hard code the port they want into their executable. (it isn't like it will change, and if they read it from /etc/services and someone had mistyped the port number it won't interoperate with clients anyway!)

It is not practical to read the /etc/services file into the kernel to prevent it from giving out port numbers that are "pre-assigned", nor is it generally desirable since with the correct ordering of startup it is completely unneccesary.

Editors Note: This information was supplied by Chuck McManis of Sun.

[]

URL = ftp://ftp.isi.edu/in-notes/iana/assignments/sun-rpc-numbers

IP OPTION NUMBERS

The Internet Protocol (IP) has provision for optional header fields identified by an option type field. Options 0 and 1 are exactly one octet which is their type field. All other options have their one octet type field, followed by a one octet length field, followed by length-2 octets of option data. The option type field is sub-divided into a one bit copied flag, a two bit class field, and a five bit option number. These taken together form an eight bit value for the option type field. IP options are commonly refered to by this value.

Copy	Class	Number	Value	Name	Reference
0	0	0	0	EOOL - End of Options List	[RFC791,JBP]
0	0	1	1	NOP - No Operation	[RFC791,JBP]
1	0	2	130	SEC - Security	[RFC1108]
1	0	3	131	LSR - Loose Source Route	[RFC791,JBP]
0	2	4	68	TS - Time Stamp	[RFC791,JBP]
1	0	5	133	E-SEC - Extended Security	[RFC1108]
1	0	6	134	CIPSO - Commercial Security	[???]
0	0	7	7	RR - Record Route	[RFC791,JBP]
1	0	8	136	SID - Stream ID	[RFC791,JBP]
1	0	9	137	SSR - Strict Source Route	[RFC791,JBP]
0	0	10	10	ZSU - Experimental Measurement	[ZSu]
0	0	11	11	MTUP - MTU Probe	[RFC1191]
0	0	12	12	MTUR - MTU Reply	[RFC1191]
1	2	13	205	FINN - Experimental Flow Control	[Finn]
1	0	14	142	VISA - Expermental Access Control	[Estrin]
0	0	15	15	ENCODE - ???	[VerSteeg]
1	0	16	144	IMITD - IMI Traffic Descriptor	[Lee]
1	0	17	145	EIP - ???	[RFC1358]
0	2	18	82	TR - Traceroute	[RFC1393]
1	0	19	147	ADDEXT - Address Extension	[Ullmann IPv7]

IP TIME TO LIVE PARAMETER

The current recommended default time to live (TTL) for the Internet Protocol (IP) [45,105] is 64.

IP TOS PARAMETERS

This documents the default Type-of-Service values that are currently recommended for the most important Internet protocols.

TOS Value	Description	Reference
0000	Default	[RFC1349]
0001	Minimize Monetary Cost	[RFC1349]
0010	Maximize Reliability	[RFC1349]
0100	Maximize Throughput	[RFC1349]
1000	Minimize Delay	[RFC1349]
1111	Maximize Security	[RFC1455]

The TOS value is used to indicate "better". Only one TOS value or property can be requested in any one IP datagram.

Generally, protocols which are involved in direct interaction with a human should select low delay, while data transfers which may involve large blocks of data are need high throughput. Finally, high reliability is most important for datagram-based Internet management functions.

Application protocols not included in these tables should be able to make appropriate choice of low delay (8 decimal, 1000 binary) or high throughput (4 decimal, 0100 binary).

The following are recommended values for TOS:

	----- Type-of-Service Value -----	
Protocol	TOS Value	
TELNET (1)	1000	(minimize delay)
FTP		
Control	1000	(minimize delay)
Data (2)	0100	(maximize throughput)
TFTP	1000	(minimize delay)
SMTP (3)		
Command phase	1000	(minimize delay)
DATA phase	0100	(maximize throughput)
Domain Name Service		
UDP Query	1000	(minimize delay)
TCP Query	0000	
Zone Transfer	0100	(maximize throughput)
NNTP	0001	(minimize monetary cost)
ICMP		

Errors	0000
Requests	0000 (4)
Responses	<same as request> (4)

Any IGP	0010	(maximize reliability)
EGP	0000	
SNMP	0010	(maximize reliability)
BOOTP	0000	

Notes:

(1) Includes all interactive user protocols (e.g., rlogin).

(2) Includes all bulk data transfer protocols (e.g., rcp).

(3) If the implementation does not support changing the TOS during the lifetime of the connection, then the recommended TOS on opening the connection is the default TOS (0000).

(4) Although ICMP request messages are normally sent with the default TOS, there are sometimes good reasons why they would be sent with some other TOS value. An ICMP response always uses the same TOS value as was used in the corresponding ICMP request message.

An application may (at the request of the user) substitute 0001 (minimize monetary cost) for any of the above values.

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ICMP TYPE NUMBERS

The Internet Control Message Protocol (ICMP) has many messages that are identified by a "type" field.

Type	Name	Reference
0	Echo Reply	[RFC792]
1	Unassigned	[JBP]
2	Unassigned	[JBP]
3	Destination Unreachable	[RFC792]
4	Source Quench	[RFC792]
5	Redirect	[RFC792]
6	Alternate Host Address	[JBP]
7	Unassigned	[JBP]
8	Echo	[RFC792]
9	Router Advertisement	[RFC1256]
10	Router Selection	[RFC1256]
11	Time Exceeded	[RFC792]
12	Parameter Problem	[RFC792]
13	Timestamp	[RFC792]
14	Timestamp Reply	[RFC792]
15	Information Request	[RFC792]
16	Information Reply	[RFC792]
17	Address Mask Request	[RFC950]
18	Address Mask Reply	[RFC950]
19	Reserved (for Security)	[Solo]
20-29	Reserved (for Robustness Experiment)	[ZSu]
30	Traceroute	[RFC1393]
31	Datagram Conversion Error	[RFC1475]
32	Mobile Host Redirect	[David Johnson]
33	IPv6 Where-Are-You	[Bill Simpson]
34	IPv6 I-Am-Here	[Bill Simpson]
35	Mobile Registration Request	[Bill Simpson]
36	Mobile Registration Reply	[Bill Simpson]
37-255	Reserved	[JBP]

Many of these ICMP types have a "code" field. Here we list the types again with their assigned code fields.

Type	Name	Reference
0	Echo Reply	[RFC792]
	Codes 0 No Code	
1	Unassigned	[JBP]

```
  2     Unassigned                                  [JBP]

  3     Destination Unreachable                  [RFC792]

        Codes
            0  Net Unreachable
            1  Host Unreachable
            2  Protocol Unreachable
            3  Port Unreachable
            4  Fragmentation Needed and Don't Fragment was Set
            5  Source Route Failed
            6  Destination Network Unknown
            7  Destination Host Unknown
            8  Source Host Isolated
            9  Communication with Destination Network is
               Administratively Prohibited
           10  Communication with Destination Host is
               Administratively Prohibited
           11  Destination Network Unreachable for Type of Service
           12  Destination Host Unreachable for Type of Service

  4     Source Quench                            [RFC792]
        Codes
            0  No Code

  5     Redirect                                 [RFC792]

        Codes
            0  Redirect Datagram for the Network (or subnet)
            1  Redirect Datagram for the Host
            2  Redirect Datagram for the Type of Service and Network
            3  Redirect Datagram for the Type of Service and Host

  6     Alternate Host Address                      [JBP]

        Codes
            0  Alternate Address for Host

  7     Unassigned                                  [JBP]

  8     Echo                                     [RFC792]

        Codes
            0  No Code

  9     Router Advertisement                    [RFC1256]

        Codes
```

```
            0  No Code

 10     Router Selection                          [RFC1256]

        Codes
            0  No Code

 11     Time Exceeded                              [RFC792]

        Codes
            0  Time to Live exceeded in Transit
            1  Fragment Reassembly Time Exceeded

 12     Parameter Problem                          [RFC792]

        Codes
            0  Pointer indicates the error
            1  Missing a Required Option         [RFC1108]
            2  Bad Length


 13     Timestamp                                  [RFC792]

        Codes
            0  No Code

 14     Timestamp Reply                            [RFC792]

        Codes
            0  No Code

 15     Information Request                        [RFC792]

        Codes
            0  No Code

 16     Information Reply                          [RFC792]

        Codes
            0  No Code

 17     Address Mask Request                       [RFC950]

        Codes
            0  No Code

 18     Address Mask Reply                         [RFC950]
```

Codes
0 No Code

19	Reserved (for Security)	[Solo]
20-29	Reserved (for Robustness Experiment)	[ZSu]
30	Traceroute	[RFC1393]
31	Datagram Conversion Error	[RFC1475]
32	Mobile Host Redirect	[David Johnson]
33	IPv6 Where-Are-You	[Bill Simpson]
34	IPv6 I-Am-Here	[Bill Simpson]
35	Mobile Registration Request	[Bill Simpson]
36	Mobile Registration Reply	[Bill Simpson]

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/icmp-parameters

TCP OPTION NUMBERS

The Transmission Control Protocol (TCP) has provision for optional header fields identified by an option kind field. Options 0 and 1 are exactly one octet which is their kind field. All other options have their one octet kind field, followed by a one octet length field, followed by length-2 octets of option data.

Kind	Length	Meaning	Reference
0	-	End of Option List	[RFC793]
1	-	No-Operation	[RFC793]
2	4	Maximum Segment Lifetime	[RFC793]
3	3	WSOPT - Window Scale	[RFC1323]
4	2	SACK Permitted	[RFC1072]
5	N	SACK	[RFC1072]
6	6	Echo (obsoleted by option 8)	[RFC1072]
7	6	Echo Reply (obsoleted by option 8)	[RFC1072]
8	10	TSOPT - Time Stamp Option	[RFC1323]
9	2	Partial Order Connection Permitted	[RFC1693]
10	5	Partial Order Service Profile	[RFC1693]
11		CC	[Braden]
12		CC.NEW	[Braden]
13		CC.ECHO	[Braden]
14	3	TCP Alternate Checksum Request	[RFC1146]
15	N	TCP Alternate Checksum Data	[RFC1146]
16		Skeeter	[Knowles]
17		Bubba	[Knowles]
18	3	Trailer Checksum Option	[Subbu & Monroe]

TCP ALTERNATE CHECKSUM NUMBERS

Number	Description	Reference
0	TCP Checksum	[RFC-1146]
1	8-bit Fletchers's algorithm	[RFC-1146]
2	16-bit Fletchers's algorithm	[RFC-1146]
3	Redundant Checksum Avoidance	[Kay]

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/tcp-parameters

TELNET OPTIONS

The Telnet Protocol has a number of options that may be negotiated. These options are listed here. "Internet Official Protocol Standards" (STD 1) provides more detailed information.

Options	Name	References
0	Binary Transmission	[RFC856,JBP]
1	Echo	[RFC857,JBP]
2	Reconnection	[NIC50005,JBP]
3	Suppress Go Ahead	[RFC858,JBP]
4	Approx Message Size Negotiation	[ETHERNET,JBP]
5	Status	[RFC859,JBP]
6	Timing Mark	[RFC860,JBP]
7	Remote Controlled Trans and Echo	[RFC726,JBP]
8	Output Line Width	[NIC50005,JBP]
9	Output Page Size	[NIC50005,JBP]
10	Output Carriage-Return Disposition	[RFC652,JBP]
11	Output Horizontal Tab Stops	[RFC653,JBP]
12	Output Horizontal Tab Disposition	[RFC654,JBP]
13	Output Formfeed Disposition	[RFC655,JBP]
14	Output Vertical Tabstops	[RFC656,JBP]
15	Output Vertical Tab Disposition	[RFC657,JBP]
16	Output Linefeed Disposition	[RFC657,JBP]
17	Extended ASCII	[RFC698,JBP]
18	Logout	[RFC727,MRC]
19	Byte Macro	[RFC735,JBP]
20	Data Entry Terminal	[RFC1043,RFC732,JBP]
22	SUPDUP	[RFC736,RFC734,MRC]
22	SUPDUP Output	[RFC749,MRC]
23	Send Location	[RFC779,EAK1]
24	Terminal Type	[RFC1091,MS56]
25	End of Record	[RFC885,JBP]
26	TACACS User Identification	[RFC927,BA4]
27	Output Marking	[RFC933,SXS]
28	Terminal Location Number	[RFC946,RN6]
29	Telnet 3270 Regime	[RFC1041,JXR]
30	X.3 PAD	[RFC1053,SL70]
31	Negotiate About Window Size	[RFC1073,DW183]
32	Terminal Speed	[RFC1079,CLH3]
33	Remote Flow Control	[RFC1372,CLH3]
34	Linemode	[RFC1184,DB14]
35	X Display Location	[RFC1096,GM23]
36	Environment Option	[RFC1408,DB14]
37	Authentication Option	[RFC1409,DB14]
38	Encryption Option	[DB14]
39	New Environment Option	[RFC1572,DB14]

40	TN3270E	[RFC1647]
255	Extended-Options-List	[RFC861,JBP]

Telnet Authentication Types

In [RFC1409], a list of authentication types is introduced. Additions to the list are registerd by the IANA and documented here.

Type	Description	Reference
0	NULL	[RFC1409]
1	KERBEROS_V4	[RFC1409]
2	KERBEROS_V5	[RFC1409]
3	SPX	[RFC1409]
4-5	Unassigned	
6	RSA	[RFC1409]
7-9	Unassigned	
10	LOKI	[RFC1409]
11	SSA	[Schoch]

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DOMAIN NAME SYSTEM PARAMETERS

The Internet Domain Naming System (DOMAIN) includes several parameters. These are documented in [RFC1034] and [RFC1035]. The CLASS parameter is listed here. The per CLASS parameters are defined in separate RFCs as indicated.

Domain System Parameters:

Decimal	Name	References
0	Reserved	[PM1]
1	Internet (IN)	[RFC1034,PM1]
2	Unassigned	[PM1]
3	Chaos (CH)	[PM1]
4	Hessoid (HS)	[PM1]
5-65534	Unassigned	[PM1]
65535	Reserved	[PM1]

In the Internet (IN) class the following TYPEs and QTYPEs are defined:

TYPE	value and meaning	
A	1 a host address	[RFC1035]
NS	2 an authoritative name server	[RFC1035]
MD	3 a mail destination (Obsolete - use MX)	[RFC1035]
MF	4 a mail forwarder (Obsolete - use MX)	[RFC1035]
CNAME	5 the canonical name for an alias	[RFC1035]
SOA	6 marks the start of a zone of authority	[RFC1035]
MB	7 a mailbox domain name (EXPERIMENTAL)	[RFC1035]
MG	8 a mail group member (EXPERIMENTAL)	[RFC1035]
MR	9 a mail rename domain name (EXPERIMENTAL)	[RFC1035]
NULL	10 a null RR (EXPERIMENTAL)	[RFC1035]
WKS	11 a well known service description	[RFC1035]
PTR	12 a domain name pointer	[RFC1035]
HINFO	13 host information	[RFC1035]
MINFO	14 mailbox or mail list information	[RFC1035]
MX	15 mail exchange	[RFC1035]
TXT	16 text strings	[RFC1035]
RP	17 for Responsible Person	[RFC1183]
AFSDB	18 for AFS Data Base location	[RFC1183]
X25	19 for X.25 PSDN address	[RFC1183]
ISDN	20 for ISDN address	[RFC1183]
RT	21 for Route Through	[RFC1183]
NSAP	22 for NSAP address, NSAP style A record	[RFC1348]
NSAP-PTR	23 for domain name pointer, NSAP style	[RFC1348]

SIG	24 for security signature	[Donald Eastlake]
KEY	25 for security key	[Donald Eastlake]
PX	26 X.400 mail mapping information	[RFC1664]
GPOS	27 Geographical Position	[Craig Farrell]
AAAA	28 IP6 Address	[Susan Thomson]
AXFR	252 transfer of an entire zone	[RFC1035]
MAILB	253 mailbox-related RRs (MB, MG or MR)	[RFC1035]
MAILA	254 mail agent RRs (Obsolete - see MX)	[RFC1035]
*	255 A request for all records	[RFC1035]

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/dns-parameters

MAIL ENCODING HEADER FIELD KEYWORDS

[RFC1505] specifies an initial list of keywords for the experimental encoding header field (EHF-MAIL), and provides that additional keywords may be registered with the IANA.

Keyword	Description	Reference
EDIFACT	EDIFACT format	[RFC1505]
EDI-X12	EDI X12 format	[ANSI-X12]
EVFU	FORTRAN format	[RFC1505]
FS	File System format	[RFC1505]
Hex	Hex binary format	[RFC1505]
LZJU90	LZJU90 format	[RFC1505]
LZW	LZW format	[RFC1505]
Message	Encapsulated Message	[RFC822]
PEM, PEM-Clear	Privacy Enhanced Mail	[RFC1421]
PGP	Pretty Good Privacy	[RFC1505]
Postscript	Postscript format	[POSTSCRIPT]
Shar	Shell Archive format	[RFC1505]
Signature	Signature	[RFC1505]
Tar	Tar format	[RFC1505]
Text	Text	[IS-10646]
uuencode	uuencode format	[RFC1505]
URL	external URL-reference	[RFC1505]

MAIL ENCRYPTION TYPES

[RFC822] specifies that Encryption Types for mail may be assigned. There are currently no RFC 822 encryption types assigned. Please use instead the Mail Privacy procedures defined in [RFC1421, RFC1422, RFC1423].

ESMTP MAIL KEYWORDS

[RFC1651] specifies that extension to SMTP can be identified with keywords.

Keywords	Description	Reference

SEND	Send as mail	[RFC821]
SOML	Send as mail or terminal	[RFC821]
SAML	Send as mail and terminal	[RFC821]
EXPN	Expand the mailing list	[RFC821]
HELP	Supply helpful information	[RFC821]
TURN	Turn the operation around	[RFC821]
8BITMIME	Use 8-bit data	[RFC1652]
SIZE	Message size declaration	[RFC1653]
VERB	Verbose	[Eric Allman]
ONEX	One message transaction only	[Eric Allman]

MAIL EXTENSION TYPES

The Simple Mail Transfer Protocol [RFC821] specifies a set of commands or services for mail transfer. A general procedure for extending the set of services is defined in [RFC1651]. The set of service extensions is listed here.

Service Ext	EHLO Keyword	Parameters	Verb	Reference
Send	SEND	none	SEND	[RFC821]
Send or Mail	SOML	none	SOML	[RFC821]
Send and Mail	SAML	none	SAML	[RFC821]
Expand	EXPN	none	EXPN	[RFC821]
Help	HELP	none	HELP	[RFC821]
Turn	TURN	none	TURN	[RFC821]
8 Bit MIME	8BITMIME	none	none	[RFC1652]
Size	SIZE	number	none	[RFC1653]

MAIL SYSTEM NAMES

In some places, an identification of other mail systems is used.

One of these is in "The COSINE and Internet X.500 Schema" (section 9.3.18) [RFC1274]. The mail system names listed here are used as the legal values in that schema under the "otherMailbox" attribute "mailboxType" type (which must be a PrintableString).

Another place is in "Mapping between X.400(1988) / ISO 10021 and RFC 822" (section 4.2.2) [RFC1327]. The names listed here are used as

the legal values in that schema under the "std-or-address" attribute "registered-dd-type" type (which must be a "key-string").

Note that key-string = <a-z, A-Z, 0-9, and "-" >.

Mail System Name	Description	Reference
mcimail	MCI Mail	

MAIL TRANSMISSION TYPES

The Simple Mail Transfer Protocol [RFC821] and the Standard for the Format of ARPA Internet Text Messages [RFC822] specify that a set of "Received" lines will be prepended to the headers of electronic mail messages as they are transported through the Internet. These received line may optionally include either or both a "via" phrase and/or a "with" phrase. The legal values for the phrases are listed here. The via phrase is intended to indicate the link or physical medium over which the message was transferred. The with phrase is intended to indicate the protocol or logical process that was used to transfer the message.

VIA link types	Description	Reference
UUCP	Unix-to-Unix Copy Program	[???]

WITH protocol types	Description	Reference
SMTP	Simple Mail Transfer Protocol	[RFC821]
ESMTP	SMTP with Service Extensions	[RFC1651]

REFERENCES

[ANSI-X12]

[POSTSCRIPT] Adobe Systems Inc., "PostScript Langpuage Reference Manual", 2nd Edition, 2nd Printing, January 1991.

[IS-10646]

[RFC821] Postel, J., "Simple Mail Transfer Protocol", STD 10, RFC 821, USC/Information Sciences Institute, August 1982.

[RFC822] Crocker, D., "Standard for the Format of ARPA-Internet Text Messages", STD 11, RFC 822, UDEL, August 1982.

[RFC1274] Barker, P., and S. Kille, "The COSINE and Internet X.500 Schema", RFC 1274, University College London, November 1991.

[RFC1327] Hardcastle-Kille, S., "Mapping between X.400(1988) / ISO 10021 and RFC 822", RFC 1327, University College London, May 1992.

[RFC1421] Linn, J., "Privacy Enhancement for Internet Electronic Mail: Part I: Message Encipherment and Authentication Procedures", RFC 1421, IAB IRTF PSRG, IETF PEM WG, February 1993.

[RFC1422] Kent, S., "Privacy Enhancement for Internet Electronic Mail: Part II -- Certificate-Based Key Management", BBN, IAB IRTF PSRG, IETF PEM, February 1993.

[RFC1423] Balenson, D., "Privacy Enhancement for Internet Electronic Mail: Part III -- Algorithms, Modes, and Identifiers", RFC 1423, TIS, IAB IRTF PSRG, IETF PEM WG, February 1993.

[RFC1505] Costanzo, A., Robinson, D., and R. Ullmann, "Encoding Header Field for Internet Messages", RFC 1505, AKC Consulting, Computervision Corporation, August 1993.

[RFC1651] Klensin, J., Freed, N., Rose, M., Stefferud, E., and D. Crocker, "SMTP Service Extensions", RFC 1651, MCI, Innosoft, Dover Beach Consulting, Inc., Network Management Associates, Inc., Silicon Graphics, Inc., July 1994.

[RFC1652] Klensin, J., Freed, N., Rose, M., Stefferud, E., and D. Crocker, "SMTP Service Extension for 8bit-MIMEtransport", RFC 1652, MCI, Innosoft, Dover Beach Consulting, Inc., Network Management Associates, Inc., Silicon Graphics, Inc., July 1994.

[RFC1653] Klensin, J., Freed, N., and K. Moore, "SMTP Service Extension for Message Size Declaration", RFC 1653, MCI, Innosoft, University of Tennessee, July 1994.

PEOPLE

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/mail-parameters

BOOTP AND DHCP PARAMETERS

The Bootstrap Protocol (BOOTP) [RFC951] describes an IP/UDP bootstrap protocol (BOOTP) which allows a diskless client machine to discover its own IP address, the address of a server host, and the name of a file to be loaded into memory and executed. The Dynamic Host Configuration Protocol (DHCP) [RFC1531] provides a framework for automatic configuration of IP hosts. The "DHCP Options and BOOTP Vendor Information Extensions" [RFC1533] describes the additions to the Bootstrap Protocol (BOOTP) which can also be used as options with the Dynamic Host Configuration Protocol (DHCP).

BOOTP Vendor Extensions and DHCP Options are listed below:

Tag	Name	Data Length	Meaning
0	Pad	0	None
1	Subnet Mask	4	Subnet Mask Value
2	Time Offset	4	Time Offset in Seconds from UTC
3	Gateways	N	N/4 Gateway addresses
4	Time Server	N	N/4 Timeserver addresses
5	Name Server	N	N/4 IEN-116 Server addresses
6	Domain Server	N	N/4 DNS Server addresses
7	Log Server	N	N/4 Logging Server addresses
8	Quotes Server	N	N/4 Quotes Server addresses
9	LPR Server	N	N/4 Printer Server addresses
10	Impress Server	N	N/4 Impress Server addresses
11	RLP Server	N	N/4 RLP Server addresses
12	Hostname	N	Hostname string
13	Boot File Size	2	Size of boot file in 512 byte chunks
14	Merit Dump File		Client to dump and name the file to dump it to
15	Domain Name	N	The DNS domain name of the client
16	Swap Server	N	Swap Server addeess
17	Root Path	N	Path name for root disk
18	Extension File	N	Path name for more BOOTP info
19	Forward On/Off	1	Enable/Disable IP Forwarding
20	SrcRte On/Off	1	Enable/Disable Source Routing
21	Policy Filter	N	Routing Policy Filters
22	Max DG Assembly	2	Max Datagram Reassembly Size
23	Default IP TTL	1	Default IP Time to Live
24	MTU Timeout	4	Path MTU Aging Timeout
25	MTU Plateau	N	Path MTU Plateau Table

26	MTU Interface	2	Interface MTU Size
27	MTU Subnet	1	All Subnets are Local
28	Broadcast Address	4	Broadcast Address
29	Mask Discovery	1	Perform Mask Discovery
30	Mask Supplier	1	Provide Mask to Others
31	Router Discovery	1	Perform Router Discovery
32	Router Request	4	Router Solicitation Address
33	Static Route	N	Static Routing Table
34	Trailers	1	Trailer Encapsulation
35	ARP Timeout	4	ARP Cache Timeout
36	Ethernet	1	Ethernet Encapsulation
37	Default TCP TTL	1	Default TCP Time to Live
38	Keepalive Time	4	TCP Keepalive Interval
39	Keepalive Data	1	TCP Keepalive Garbage
40	NIS Domain	N	NIS Domain Name
41	NIS Servers	N	NIS Server Addresses
42	NTP Servers	N	NTP Server Addresses
43	Vendor Specific	N	Vendor Specific Information
44	NETBIOS Name Srv	N	NETBIOS Name Servers
45	NETBIOS Dist Srv	N	NETBIOS Datagram Distribution
46	NETBIOS Note Type	1	NETBIOS Note Type
47	NETBIOS Scope	N	NETBIOS Scope
48	X Window Font	N	X Window Font Server
49	X Window Manmager	N	X Window Display Manager
50	Address Request	4	Requested IP Address
51	Address Time	4	IP Address Lease Time
52	Overload	1	Overloaf "sname" or "file"
53	DHCP Msg Type	1	DHCP Message Type
54	DHCP Server Id	4	DHCP Server Identification
55	Parameter List	N	Parameter Request List
56	DHCP Message	N	DHCP Error Message
57	DHCP Max Msg Size	2	DHCP Maximum Message Size
58	Renewal Time	4	DHCP Renewal (T1) Time
59	Rebinding Time	4	DHCP Rebinding (T2) Time
60	Class Id	N	Class Identifier
61	Client Id	N	Client Identifier
62	Netware/IP Domain	N	Netware/IP Domain Name
63	Netware/IP Option	N	Netware/IP sub Options
64-127	Unassigned		
128-154	Reserved		
255	End	0	None

REFERENCES

[RFC951] Croft, B., and J. Gilmore, "BOOTSTRAP Protocol (BOOTP)", RFC-951, Stanford and SUN Microsytems, September 1985.

[RFC1531] Droms, R., "Dynamic Host Configuration Protocol", Bucknell University, October 1993.

[RFC1533] Alexander, S., and R. Droms, "DHCP Options and BOOTP Vendor Extensions", Lachman Technology, Inc., Bucknell University, October 1993.

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/bootp-and-dhcp-parameters

ADDRESS FAMILY NUMBERS

Several protocols deal with multiple address families. The 16-bit assignments are listed here.

Number	Description	Reference
0	Reserved	
1	IP (IP version 4)	
2	IP6 (IP version 6)	
3	NSAP	
4	HDLC (8-bit multidrop)	
5	BBN 1822	
6	802 (includes all 802 media plus Ethernet "canonical format")	
7	E.163	
8	E.164 (SMDS, Frame Relay, ATM)	
9	F.69 (Telex)	
10	X.121 (X.25, Frame Relay)	
11	IPX	
12	Appletalk	
13	Decnet IV	
14	Banyan Vines	
65535	Reserved	

[]

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FOOBAR AF NUMBERS

In the FTP Operation Over Big Address Records (FOOBAR) Protocol [RFC1639] there is a field, called "address family" or "af", to identify the lower level protocol addresses in use. This is an 8 bit field. The first 16 assignments (0-15) of the af value are exactly the same as the IP Version number. The assignment for values 16-255 are listed here.

Assigned FOOBAR Address Families

Decimal	Keyword	Address Family	References
16	IPX	Novell IPX	
17-254		Unassigned	
255		Reserved	

REFERENCES

[RFC1639] Piscitello, D., "FTP Operation Over Big Address Records (FOOBAR)", Core Competence, Inc., June 1994.

[]

URL = ftp://ftp.isi.edu/in-notes/iana/assignments/foobar-af-numbers

DIRECTORY SYSTEM NAMES

In the representation of distinquished names (and possibly other contexts) of the X.500 Directory system, several unique keywords may be necessary. For example, in the string representation of distinguished names [RFC1485].

Keyword	Attribute (X.520 keys)
CN	CommonName
L	LocalityName
ST	StateOrProvinceName
O	OrganizationName
OU	OrganizationalUnitName
C	CountryName

REFERENCES

[RFC1485] Hardcastle-Kille, S., "A String Representation of Distinguished Names (OSI-DS 23 (v5))", RFC1485, ISODE Consortium, July 1993.

[]

URL = ftp://ftp.isi.edu/in-notes/iana/assignments/directory-system-names

PUBLISHER IDENTIFICATION CODE

The RFC "A Format for E-Mailing Bibliographic Records" [RFC1357] establishs a "publisher-ID" code. The IANA registry of these codes is listed here.

Code	Publisher	Reference
DUMMY	for testing only	[RFC1357]
TEST	for testing only	[RFC1357]
ISI	Information Sciences Institute of the University of Southern California	[JBP]
UMCS	University of Manchester Computer Science Department	[TXC]

REFERENCES

[RFC1357] Cohen, D., Editor, "A Format for E-mailing Bibliographic Records", RFC 1357, USC/Information Sciences Institute, July 1992.

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/publisher-id

OSPF AUTHENTICATION CODES

The Open Shotrest Path First (OSPF) protocols has a provision for authentication, and the type of authentication can me indicated by a code number. The following are the registered authentication codes.

Code	Authentication Method	Reference
0	No Authentication	[RFC1583]
1	Simple Password Authentication	[RFC1583]
2-65535	Reserved	

REFERENCES

[RFC1583] Moy, J., "OSPF Version 2", RFC 1583, Proteon, Inc., March 1994.

[RFC1584] Moy, J., "Multicast Extensions to OSPF", RFC 1584, Proteon, Inc., March 1994.

[RFC1585] Moy, J., "MOSPF: Analysis and Experience", RFC 1585, Proteon, Inc., March 1994.

[RFC1586] deSouza, O., and M. Rodrigues, "Guidelines for Running OSPF Over Frame Relay Networks", RFC 1586, AT&T Bell Laboratories, March 1994.

[RFC1587] Coltun, R., and V. Fuller, "The OSPF NSSA Option", RFC 1587, RainbowBridge Communications, BARRNet, March 1994.

[]

URL = ftp://ftp.isi.edu/in-notes/iana/assignments/ospf-authentication-codes

MEDIA TYPES

[RFC1521] specifies that Content Types, Content Subtypes, Character Sets, Access Types, and Conversion values for MIME mail will be assigned and listed by the IANA.

Content Types and Subtypes

Type	Subtype	Description	Reference
text	plain		[RFC1521,NSB]
	richtext		[RFC1521,NSB]
	tab-separated-values		[Paul Lindner]
multipart	mixed		[RFC1521,NSB]
	alternative		[RFC1521,NSB]
	digest		[RFC1521,NSB]
	parallel		[RFC1521,NSB]
	appledouble		[MacMime,Patrik Faltstrom]
	header-set		[Dave Crocker]
message	rfc822		[RFC1521,NSB]
	partial		[RFC1521,NSB]
	external-body		[RFC1521,NSB]
	news		[RFC 1036, Henry Spencer]
application	octet-stream		[RFC1521,NSB]
	postscript		[RFC1521,NSB]
	oda		[RFC1521,NSB]
	atomicmail		[atomicmail,NSB]
	andrew-inset		[andrew-inset,NSB]
	slate		[slate,terry crowley]
	wita		[Wang Info Transfer,Larry Campbell]
	dec-dx		[Digital Doc Trans, Larry Campbell]
	dca-rft		[IBM Doc Content Arch, Larry Campbell]
	activemessage		[Ehud Shapiro]
	rtf		[Paul Lindner]
	applefile		[MacMime,Patrik Faltstrom]
	mac-binhex40		[MacMime,Patrik Faltstrom]
	news-message-id		[RFC1036, Henry Spencer]
	news-transmission		[RFC1036, Henry Spencer]
	wordperfect5.1		[Paul Lindner]
	pdf		[Paul Lindner]
	zip		[Paul Lindner]
	macwriteii		[Paul Lindner]

	msword		[Paul Lindner]
	remote-printing		[RFC1486,MTR]
image	jpeg		[RFC1521,NSB]
	gif		[RFC1521,NSB]
	ief	Image Exchange Format	[RFC1314]
	tiff	Tag Image File Format	[MTR]
audio	basic		[RFC1521,NSB]
video	mpeg		[RFC1521,NSB]
	quicktime		[Paul Lindner]

The "media-types" directory contains a subdirectory for each content type and each of those directories contains a file for each content subtype.

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Character Sets

All of the character sets listed the section on Character Sets are registered for use with MIME as MIME Character Sets. The correspondance between the few character sets listed in the MIME specification [RFC1521] and the list in that section are:

Type	Description	Reference
US-ASCII	see ANSI_X3.4-1968 below	[RFC1521,NSB]
ISO-8859-1	see ISO_8859-1:1987 below	[RFC1521,NSB]
ISO-8859-2	see ISO_8859-2:1987 below	[RFC1521,NSB]
ISO-8859-3	see ISO_8859-3:1988 below	[RFC1521,NSB]
ISO-8859-4	see ISO_8859-4:1988 below	[RFC1521,NSB]
ISO-8859-5	see ISO_8859-5:1988 below	[RFC1521,NSB]
ISO-8859-6	see ISO_8859-6:1987 below	[RFC1521,NSB]
ISO-8859-7	see ISO_8859-7:1987 below	[RFC1521,NSB]
ISO-8859-8	see ISO_8859-8:1988 below	[RFC1521,NSB]
ISO-8859-9	see ISO_8859-9:1989 below	[RFC1521,NSB]

Access Types

Type	Description	Reference
FTP		[RFC1521,NSB]
ANON-FTP		[RFC1521,NSB]
TFTP		[RFC1521,NSB]
AFS		[RFC1521,NSB]
LOCAL-FILE		[RFC1521,NSB]
MAIL-SERVER		[RFC1521,NSB]

Conversion Values

Conversion values or Content Transfer Encodings.

Type	Description	Reference
7BIT		[RFC1521,NSB]
8BIT		[RFC1521,NSB]
BASE64		[RFC1521,NSB]
BINARY		[RFC1521,NSB]
QUOTED-PRINTABLE		[RFC1521,NSB]

MIME / X.400 MAPPING TABLES

MIME to X.400 Table

MIME content-type	X.400 Body Part	Reference
text/plain		
charset=us-ascii	ia5-text	[RFC1494]
charset=iso-8859-x	EBP - GeneralText	[RFC1494]
text/richtext	no mapping defined	[RFC1494]
application/oda	EBP - ODA	[RFC1494]
application/octet-stream	bilaterally-defined	[RFC1494]
application/postscript	EBP - mime-postscript-body	[RFC1494]
image/g3fax	g3-facsimile	[RFC1494]
image/jpeg	EBP - mime-jpeg-body	[RFC1494]
image/gif	EBP - mime-gif-body	[RFC1494]
audio/basic	no mapping defined	[RFC1494]
video/mpeg	no mapping defined	[RFC1494]

Abbreviation: EBP - Extended Body Part

X.400 to MIME Table

Basic Body Parts

X.400 Basic Body Part	MIME content-type	Reference
ia5-text	text/plain;charset=us-ascii	[RFC1494]
voice	No Mapping Defined	[RFC1494]
g3-facsimile	image/g3fax	[RFC1494]
g4-class1	no mapping defined	[RFC1494]
teletex	no mapping defined	[RFC1494]
videotex	no mapping defined	[RFC1494]
encrypted	no mapping defined	[RFC1494]
bilaterally-defined	application/octet-stream	[RFC1494]
nationally-defined	no mapping defined	[RFC1494]
externally-defined	See Extended Body Parts	[RFC1494]

X.400 Extended Body Part	MIME content-type	Reference
GeneralText	text/plain;charset=iso-8859-x	[RFC1494]
ODA	application/oda	[RFC1494]
mime-postscript-body	application/postscript	[RFC1494]
mime-jpeg-body	image/jpeg	[RFC1494]
mime-gif-body	image/gif	[RFC1494]

REFERENCES

[MacMime] Work in Progress.

[RFC1036] Horton, M., and R. Adams, "Standard for Interchange of USENET Messages", RFC 1036, AT&T Bell Laboratories, Center for Seismic Studies, December 1987.

[RFC1494] Alvestrand, H., and S. Thompson, "Equivalences between 1988 X.400 and RFC-822 Message Bodies", RFC 1494, SINTEF DELAB, Soft*Switch, Inc., August 1993.

[RFC1521] Borenstien, N., and N. Freed, "MIME (Multipurpose Internet Mail Extensions) Part One: Mechanisms for Specifying and Describing the Format of Internet Message Bodies", RFC 1521, Bellcore, Innosoft, September 1993.

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[Ehud Shapiro]

[Henry Spencer]

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/media-types/media-types

CHARACTER SETS

These are the official names for character sets that may be used in the Internet and may be referred to in Internet documentation. These names are expressed in ANSI_X3.4-1968 which is commonly called US-ASCII or simply ASCII. The character set most commonly use in the Internet and used especially in protocol standards is US-ASCII, this is strongly encouraged. The use of the name US-ASCII is also encouraged.

The character set names may be up to 40 characters taken from the printable characters of US-ASCII. However, no distinction is made between use of upper and lower case letters.

Character Set	Reference

Name: ANSI_X3.4-1968 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-6
Alias: ANSI_X3.4-1986
Alias: ISO_646.irv:1991
Alias: ASCII
Alias: ISO646-US
Alias: US-ASCII
Alias: us
Alias: IBM367
Alias: cp367

Name: ISO-10646-UCS-2
Source: the 2-octet Basic Multilingual Plane, aka Unicode
this needs to specify network byte order: the standard
does not specify (it is a 16-bit integer space)

Name: ISO-10646-UCS-4
Source: the full code space. (same comment about byte order,
these are 31-bit numbers.

Name: ISO-10646-UTF-1
Source: Universal Transfer Format (1), this is the multibyte
encoding, that subsets ASCII-7. It does not have byte
ordering issues.

Name: ISO_646.basic:1983 [RFC1345,KXS2]
Source: ECMA registry
Alias: ref

Name: INVARIANT [RFC1345,KXS2]

Name: ISO_646.irv:1983 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-2
Alias: irv

Name: BS_4730 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-4
Alias: ISO646-GB
Alias: gb
Alias: uk

Name: NATS-SEFI [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-8-1

Name: NATS-SEFI-ADD [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-8-2

Name: NATS-DANO [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-9-1

Name: NATS-DANO-ADD [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-9-2

Name: SEN_850200_B [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-10
Alias: FI
Alias: ISO646-FI
Alias: ISO646-SE
Alias: se

Name: SEN_850200_C [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-11
Alias: ISO646-SE2
Alias: se2

Name: KS_C_5601-1987 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-149
Alias: KS_C_5601-1989

Alias: KSC_5601
Alias: korean

Name: ISO-2022-KR [RFC1557,Choi]
Source: RFC-1557 (see also KS_C_5601-1987)

Name: EUC-KR [RFC1557,Choi]
Source: RFC-1557 (see also KS_C_5861-1992)

Name: ISO-2022-JP [RFC1468,Murai]
Source: RFC-1468

Name: ISO-2022-JP-2 [RFC1554,Ohta]
Source: RFC-1554

Name: JIS_C6220-1969-jp [RFC1345,KXS2]
Source: ECMA registry
Alias: JIS_C6220-1969
Alias: iso-ir-13
Alias: katakana
Alias: x0201-7

Name: JIS_C6220-1969-ro [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-14
Alias: jp
Alias: ISO646-JP

Name: IT [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-15
Alias: ISO646-IT

Name: PT [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-16
Alias: ISO646-PT

Name: ES [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-17
Alias: ISO646-ES

Name: greek7-old [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-18

Name: latin-greek [RFC1345,KXS2]

Source: ECMA registry
Alias: iso-ir-19

Name: DIN_66003 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-21
Alias: de
Alias: ISO646-DE

Name: NF_Z_62-010_(1973) [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-25
Alias: ISO646-FR1

Name: Latin-greek-1 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-27

Name: ISO_5427 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-37

Name: JIS_C6226-1978 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-42

Name: BS_viewdata [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-47

Name: INIS [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-49

Name: INIS-8 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-50

Name: INIS-cyrillic [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-51

Name: ISO_5427:1981 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-54

Name: ISO_5428:1980 [RFC1345,KXS2]
Source: ECMA registry

Alias: iso-ir-55

Name: GB_1988-80 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-57
Alias: cn
Alias: ISO646-CN

Name: GB_2312-80 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-58
Alias: chinese

Name: NS_4551-1 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-60
Alias: ISO646-NO
Alias: no

Name: NS_4551-2 [RFC1345,KXS2]
Source: ECMA registry
Alias: ISO646-NO2
Alias: iso-ir-61
Alias: no2

Name: NF_Z_62-010 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-69
Alias: ISO646-FR
Alias: fr

Name: videotex-suppl [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-70

Name: PT2 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-84
Alias: ISO646-PT2

Name: ES2 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-85
Alias: ISO646-ES2

Name: MSZ_7795.3 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-86

Alias: ISO646-HU
Alias: hu

Name: JIS_C6226-1983 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-87
Alias: x0208
Alias: JIS_X0208-1983

Name: greek7 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-88

Name: ASMO_449 [RFC1345,KXS2]
Source: ECMA registry
Alias: ISO_9036
Alias: arabic7
Alias: iso-ir-89

Name: iso-ir-90 [RFC1345,KXS2]
Source: ECMA registry

Name: JIS_C6229-1984-a [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-91
Alias: jp-ocr-a

Name: JIS_C6229-1984-b [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-92
Alias: ISO646-JP-OCR-B
Alias: jp-ocr-b

Name: JIS_C6229-1984-b-add [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-93
Alias: jp-ocr-b-add

Name: JIS_C6229-1984-hand [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-94
Alias: jp-ocr-hand

Name: JIS_C6229-1984-hand-add [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-95
Alias: jp-ocr-hand-add

Name: JIS_C6229-1984-kana [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-96

Name: ISO_2033-1983 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-98
Alias: e13b

Name: ANSI_X3.110-1983 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-99
Alias: CSA_T500-1983
Alias: NAPLPS

Name: ISO_8859-1:1987 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-100
Alias: ISO_8859-1
Alias: ISO-8859-1
Alias: latin1
Alias: l1
Alias: IBM819
Alias: CP819

Name: ISO_8859-2:1987 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-101
Alias: ISO_8859-2
Alias: ISO-8859-2
Alias: latin2
Alias: l2

Name: T.61-7bit [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-102

Name: T.61-8bit [RFC1345,KXS2]
Alias: T.61
Source: ECMA registry
Alias: iso-ir-103

Name: ISO_8859-3:1988 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-109
Alias: ISO_8859-3
Alias: ISO-8859-3
Alias: latin3

Alias: l3

Name: ISO_8859-4:1988 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-110
Alias: ISO_8859-4
Alias: ISO-8859-4
Alias: latin4
Alias: l4

Name: ECMA-cyrillic [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-111

Name: CSA_Z243.4-1985-1 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-121
Alias: ISO646-CA
Alias: csa7-1
Alias: ca

Name: CSA_Z243.4-1985-2 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-122
Alias: ISO646-CA2
Alias: csa7-2

Name: CSA_Z243.4-1985-gr [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-123

Name: ISO_8859-6:1987 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-127
Alias: ISO_8859-6
Alias: ISO-8859-6
Alias: ECMA-114
Alias: ASMO-708
Alias: arabic

Name: ISO_8859-6-E [RFC1556,IANA]
Source: RFC-1556

Name: ISO_8859-6-I [RFC1556,IANA]
Source: RFC-1556

Name: ISO_8859-7:1987 [RFC1345,KXS2]
Source: ECMA registry

Alias: iso-ir-126
Alias: ISO_8859-7
Alias: ISO-8859-7
Alias: ELOT_928
Alias: ECMA-118
Alias: greek
Alias: greek8

Name: T.101-G2 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-128

Name: ISO_8859-8:1988 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-138
Alias: ISO_8859-8
Alias: ISO-8859-8
Alias: hebrew

Name: ISO_8859-8-E [RFC1556,Nussbacher]
Source: RFC-1556

Name: ISO_8859-8-I [RFC1556,Nussbacher]
Source: RFC-1556

Name: CSN_369103 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-139

Name: JUS_I.B1.002 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-141
Alias: ISO646-YU
Alias: js
Alias: yu

Name: ISO_6937-2-add [RFC1345,KXS2]
Source: ECMA registry and ISO 6937-2:1983
Alias: iso-ir-142

Name: IEC_P27-1 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-143

Name: ISO_8859-5:1988 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-144
Alias: ISO_8859-5

Alias: ISO-8859-5
Alias: cyrillic

Name: JUS_I.B1.003-serb [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-146
Alias: serbian

Name: JUS_I.B1.003-mac [RFC1345,KXS2]
Source: ECMA registry
Alias: macedonian
Alias: iso-ir-147

Name: ISO_8859-9:1989 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-148
Alias: ISO_8859-9
Alias: ISO-8859-9
Alias: latin5
Alias: l5

Name: greek-ccitt [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-150

Name: NC_NC00-10:81 [RFC1345,KXS2]
Source: ECMA registry
Alias: cuba
Alias: iso-ir-151
Alias: ISO646-CU

Name: ISO_6937-2-25 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-152

Name: GOST_19768-74 [RFC1345,KXS2]
Source: ECMA registry
Alias: ST_SEV_358-88
Alias: iso-ir-153

Name: ISO_8859-supp [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-154
Alias: latin1-2-5

Name: ISO_10367-box [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-155

Name: latin6 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-157
Alias: l6

Name: latin-lap [RFC1345,KXS2]
Source: ECMA registry
Alias: lap
Alias: iso-ir-158

Name: JIS_X0212-1990 [RFC1345,KXS2]
Source: ECMA registry
Alias: x0212
Alias: iso-ir-159

Name: DS_2089 [RFC1345,KXS2]
Source: Danish Standard, DS 2089, February 1974
Alias: DS2089
Alias: ISO646-DK
Alias: dk

Name: us-dk [RFC1345,KXS2]

Name: dk-us [RFC1345,KXS2]

Name: JIS_X0201 [RFC1345,KXS2]
Alias: X0201

Name: KSC5636 [RFC1345,KXS2]
Alias: ISO646-KR

Name: DEC-MCS [RFC1345,KXS2]
Source: VAX/VMS User's Manual,
Order Number: AI-Y517A-TE, April 1986.
Alias: dec

Name: hp-roman8 [RFC1345,KXS2]
Source: LaserJet IIP Printer User's Manual,
HP part no 33471-90901, Hewlet-Packard, June 1989.
Alias: roman8
Alias: r8

Name: macintosh [RFC1345,KXS2]
Source: The Unicode Standard ver1.0, ISBN 0-201-56788-1, Oct 1991
Alias: mac

Name: IBM037 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990

Alias: cp037
Alias: ebcdic-cp-us
Alias: ebcdic-cp-ca
Alias: ebcdic-cp-wt
Alias: ebcdic-cp-nl

Name: IBM038 [RFC1345,KXS2]
Source: IBM 3174 Character Set Ref, GA27-3831-02, March 1990
Alias: EBCDIC-INT
Alias: cp038

Name: IBM273 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: CP273

Name: IBM274 [RFC1345,KXS2]
Source: IBM 3174 Character Set Ref, GA27-3831-02, March 1990
Alias: EBCDIC-BE
Alias: CP274

Name: IBM275 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: EBCDIC-BR
Alias: cp275

Name: IBM277 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: EBCDIC-CP-DK
Alias: EBCDIC-CP-NO

Name: IBM278 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: CP278
Alias: ebcdic-cp-fi
Alias: ebcdic-cp-se

Name: IBM280 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: CP280
Alias: ebcdic-cp-it

Name: IBM281 [RFC1345,KXS2]
Source: IBM 3174 Character Set Ref, GA27-3831-02, March 1990
Alias: EBCDIC-JP-E
Alias: cp281

Name: IBM284 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990

Alias: CP284
Alias: ebcdic-cp-es

Name: IBM285 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: CP285
Alias: ebcdic-cp-gb

Name: IBM290 [RFC1345,KXS2]
Source: IBM 3174 Character Set Ref, GA27-3831-02, March 1990
Alias: cp290
Alias: EBCDIC-JP-kana

Name: IBM297 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp297
Alias: ebcdic-cp-fr

Name: IBM420 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990,
IBM NLS RM p 11-11
Alias: cp420
Alias: ebcdic-cp-ar1

Name: IBM423 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp423
Alias: ebcdic-cp-gr

Name: IBM424 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp424
Alias: ebcdic-cp-he

Name: IBM437 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp437
Alias: 437

Name: IBM500 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: CP500
Alias: ebcdic-cp-be
Alias: ebcdic-cp-ch

Name: IBM850 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp850

Alias: 850

Name: IBM851 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp851
Alias: 851

Name: IBM852 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp852
Alias: 852

Name: IBM855 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp855
Alias: 855

Name: IBM857 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp857
Alias: 857

Name: IBM860 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp860
Alias: 860

Name: IBM861 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp861
Alias: 861
Alias: cp-is

Name: IBM862 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp862
Alias: 862

Name: IBM863 [RFC1345,KXS2]
Source: IBM Keyboard layouts and code pages, PN 07G4586 June 1991
Alias: cp863
Alias: 863

Name: IBM864 [RFC1345,KXS2]
Source: IBM Keyboard layouts and code pages, PN 07G4586 June 1991
Alias: cp864

Name: IBM865 [RFC1345,KXS2]

Source: IBM DOS 3.3 Ref (Abridged), 94X9575 (Feb 1987)
Alias: cp865
Alias: 865

Name: IBM868 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: CP868
Alias: cp-ar

Name: IBM869 [RFC1345,KXS2]
Source: IBM Keyboard layouts and code pages, PN 07G4586 June 1991
Alias: cp869
Alias: 869
Alias: cp-gr

Name: IBM870 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: CP870
Alias: ebcdic-cp-roece
Alias: ebcdic-cp-yu

Name: IBM871 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: CP871
Alias: ebcdic-cp-is

Name: IBM880 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp880
Alias: EBCDIC-Cyrillic

Name: IBM891 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp891

Name: IBM903 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp903

Name: IBM904 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: cp904
Alias: 904

Name: IBM905 [RFC1345,KXS2]
Source: IBM 3174 Character Set Ref, GA27-3831-02, March 1990
Alias: CP905
Alias: ebcdic-cp-tr

Name: IBM918 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: CP918
Alias: ebcdic-cp-ar2

Name: IBM1026 [RFC1345,KXS2]
Source: IBM NLS RM Vol2 SE09-8002-01, March 1990
Alias: CP1026

Name: EBCDIC-AT-DE [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-AT-DE-A [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-CA-FR [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-DK-NO [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-DK-NO-A [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-FI-SE [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-FI-SE-A [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-FR [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-IT [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-PT [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-ES [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-ES-A [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-ES-S [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-UK [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: EBCDIC-US [RFC1345,KXS2]
Source: IBM 3270 Char Set Ref Ch 10, GA27-2837-9, April 1987

Name: UNKNOWN-8BIT [RFC1428]

Name: MNEMONIC [RFC1345,KXS2]
Source: RFC 1345, also known as "mnemonic+ascii+38"

Name: MNEM [RFC1345,KXS2]
Source: RFC 1345, also known as "mnemonic+ascii+8200"

Name: VISCII [RFC1456]
Source: RFC 1456

Name: VIQR [RFC1456]
Source: RFC 1456

Name: KOI8-R [RFC1489]
Source: RFC 1489, based on GOST-19768-74, ISO-6937/8,
INIS-Cyrillic, ISO-5427.

Name: UNICODE-1-1 [RFC1641]
Source: RFC 1641

Name: UNICODE-1-1-UTF-7 [RFC1642]
Source: RFC 1642

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[]

URL = ftp://ftp.isi.edu/in-notes/iana/assignments/character-sets

NETWORK MANAGEMENT PARAMETERS

For the management of hosts and gateways on the Internet a data structure for the information has been defined. This data structure should be used with any of several possible management protocols, such as the "Simple Network Management Protocol" (SNMP) [RFC1157], or the "Common Management Information Protocol over TCP" (CMOT) [RFC1095].

The data structure is the "Structure and Indentification of Management Information for TCP/IP-based Internets" (SMI) [RFC1155], and the "Management Information Base for Network Management of TCP/IP-based Internets" (MIB-II) [RFC1213].

The SMI includes the provision for panrameters or codes to indicate experimental or private data structures. These parameter assignments are listed here.

The older "Simple Gateway Monitoring Protocol" (SGMP) [RFC1028] also defined a data structure. The parameter assignments used with SGMP are included here for historical completeness.

The network management object identifiers are under the iso (1), org (3), dod (6), internet (1), or 1.3.6.1, branch of the name space.

The major branches are:

1	iso
1.3	org
1.3.6	dod
1.3.6.1	internet
1.3.6.1.1	directory
1.3.6.1.2	mgmt
1.3.6.1.2.1	mib-2
1.3.6.1.2.1.2.2.1.3	ifType
1.3.6.1.2.1.10	transmission
1.3.6.1.2.1.10.23	transmission.ppp
1.3.6.1.2.1.27	application
1.3.6.1.2.1.28	mta
1.3.6.1.3	experimental
1.3.6.1.4	private
1.3.6.1.4.1	enterprise
1.3.6.1.5	security
1.3.6.1.6	SNMPv2
1.3.6.1.7	mail

SMI Network Management Directory Codes:

Prefix: iso.org.dod.internet.directory (1.3.6.1.1.)

Decimal	Name	Description	References
all	Reserved	Reserved for future use	[IANA]

SMI Network Management MGMT Codes:

Prefix: iso.org.dod.internet.mgmt (1.3.6.1.2.)

Decimal	Name	Description	References
0	Reserved		[IANA]
1	MIB		[KZM]

Prefix: iso.org.dod.internet.mgmt.mib-2 (1.3.6.1.2.1)

Decimal	Name	Description	References
0	Reserved	Reserved	[IANA]
1	system	System	[RFC1213,KZM]
2	interfaces	Interfaces	[RFC1213,KZM]
3	at	Address Translation	[RFC1213,KZM]
4	ip	Internet Protocol	[RFC1213,KZM]
5	icmp	Internet Control Message	[RFC1213,KZM]
6	tcp	Transmission Control Protocol	[RFC1213,KZM]
7	udp	User Datagram Protocol	[RFC1213,KZM]
8	egp	Exterior Gateway Protocol	[RFC1213,KZM]
9	cmot	CMIP over TCP	[RFC1213,KZM]
10	transmission	Transmission	[RFC1213,KZM]
11	snmp	Simple Network Management	[RFC1213,KZM]
12	GenericIF	Generic Interface Extensions --	[RFC1229,RFC1239,KZM]
13	Appletalk	Appletalk Networking	[RFC1243,SXW]
14	ospf	Open Shortest Path First	[RFC1253,FB77]
15	bgp	Border Gateway Protocol	[RFC1657]
16	rmon	Remote Network Monitoring	[RFC1271,SXW]
17	bridge	Bridge Objects	[RFC1286,EXD]
18	DecnetP4	Decnet Phase 4	[RFC1559, Saperia]
19	Character	Character Streams	[RFC1658]
20	snmpParties	SNMP Parties	[RFC1353,KZM]
21	snmpSecrets	SNMP Secrets	[RFC1353,KZM]
22	snmpDot3RptrMgt		[RFC1516]
23	rip-2	Routing Information Protocol	[RFC1389]
24	ident	Identification Protocol	[RFC1414]
25	host	Host Resources	[RFC1514]
26	snmpDot3MauMgt	802.3 Medium Attachment Units	[RFC1515]
27	application	Network Services Monitoring	[RFC1565]
28	mta	Mail Monitoring	[RFC1566]
29	dsa	X.500 Directory Monitoring	[RFC1567]

30	IANAifType	Interface Types	[RFC1573]
31	ifMIB	Interface Types	[RFC1573]
32	dns	Domain Name System	[RFC1611]
33	upsMIB	Uninterruptible Power Supplies	[RFC1628]
34	sannauMIB	SNA NAU MIB	[RFC1665]
35	etherMIB	Ethernet-like generic objects	[RFC1650]
36	sipMIB	SMDS inteface objects	[RFC1694]
37	atmMIB	ATM objects	[RFC1695]
38	mdmMIB	Dial-up modem objects	[RFC1696]
39	rdbmsMIB	relational database objects	[RFC1697]

Prefix: iso.org.dod.internet.mgmt.mib-2.interface (1.3.6.1.2.1.2)

(1.3.6.1.2.1.2.2.1.3)

ifType definitions

Decimal	Name	Description	
1	other	none of the following	[RFC1213]
2	regular1822	BBN Report 1822	[RFC1213]
3	hdh1822	BBN Report 1822	[RFC1213]
4	ddn-x25	BBN Report 1822	[RFC1213]
5	x25	X.25	[RFC1382]
6	ethernet-csmacd		[RFC1213]
7	IEEE802.3	CSMACD--like Objects	[RF1284,JXC]
8	IEEE802.4	Token Bus-like Objects	
--			[RFC1230,RFC1239,KZM]
9	IEEE802.5	Token Ring-like Objects	
--			[RFC1231,RFC1239,KZM]
10	iso88026-man		[RFC1213]
11	starLan		[RFC1213]
12	proteon-10Mbit		[RFC1213]
13	proteon-80Mbit		[RFC1213]
14	hyperchannel		[RFC1213]
15	FDDI	FDDI Objects	[RFC1285,JDC20]
16	lapb	LAP B	[RFC1381]
17	sdlc		[RFC1213]
18	ds1	T1/E1 Carrier Objects	[RFC1406]
19	e1	obsolete	
20	basicISDN		[RFC1213]
21	primaryISDN		[RFC1213]
22	propPointToPointSerial		[RFC1213]
23	ppp	Point-to-Point Protocol	[RFC1471]
24	softwareLoopback		[RFC1213]
25	eon		[RFC1213]
26	ethernet-3Mbit		[RFC1213]
27	nsip		[RFC1213]

28	slip		[RFC1213]
29	ultra		[RFC1213]
30	ds3	DS3/E3 Interface Objects	[RFC1407]
31	sip	SMDS Interface Objects	[RFC1304,TXC]
32	frame-relay	Frame Relay Objects	[RFC1315,CXB]
33	RS-232	RS-232 Objects	[RFC1659]
34	Parallel	Parallel Printer Objects	[RFC1660]
35	arcnet	ARC network	
36	arcnet-plus	ARC network plus	
37	atm	ATM	
38	MIOX25	MIOX25	[RFC1461]
39	SONET	SONET or SDH	
40	x25ple	X.25 packet level	[RFC1382]
41	iso88022llc	802.2 LLC	
42	localTalk		
43	smds-dxi	SMDS DXI	
44	frameRelayService	Frame Relay DCE	
45	v35	V.35	
46	hssi	HSSI	
47	hippi	HIPPI	
48	modem	generic modem	
49	aal5	AAL5 over ATM	
50	sonetPath		
51	sonetVT		
52	smds-icip	SMDS Inter-Carrier Interface Protocol	
53	propVirtual	proprietary vitural/internal interface	
54	propMultiLink	proprietary multi-link multiplexing	
55	IEEE802.12	100BaseVG	
56	fibre-channel	Fibre Channel	

Prefix: iso.org.dod.internet.mgmt.mib-2.transmission (1.3.6.1.2.1.10)

Decimal	Name	Description	
5	x25	X.25	[RFC1382]
7	IEEE802.3	CSMACD--like Objects	[RFC1650]
8	IEEE802.4	Token Bus-like Objects	
--			[RFC1230,RFC1239,KZM]
9	IEEE802.5	Token Ring-like Objects	
--			[RFC1231,RFC1239,KZM]
15	FDDI	FDDI Objects	[RFC1285,JDC20]
16	lapb	LAP B	[RFC1381]
18	ds1	T1 Carrier Objects	[RFC1406]
19	e1	E1 Carrier Objects	[RFC1406]
23	ppp	Point-to-Point Protocol	[RFC1471]
30	ds3	DS3/E3 Interface Objects	[RFC1407]
31	sip	SMDS Interface Objects	[RFC1694]
32	frame-relay	Frame Relay Objects	[RFC1315,CXB]

33	RS-232	RS-232 Objects	[RFC1659]
34	Parallel	Parallel Printer Objects	[RFC1660]
35	arcnet	ARC network	
36	arcnet-plus	ARC network plus	
37	atm	ATM	
38	MIOX25	MIOX25	[RFC1461]
39	sonetMIB	SONET MIB	[RFC1595]
44	frnetservMIB	Frame Relay Service MIB for DCE	[RFC1596]

Prefix: iso.org.dod.internet.mgmt.mib-2.transmission (1.3.6.1.2.1.10)

(1.3.6.1.2.1.10.23)

Decimal	Name	Description	References
1	pppLcp	ppp link control	[RFC1471]
2	pppSecurity	ppp security	[RFC1472]
3	pppIp	ppp IP network control	[RFC1473]
4	pppBridge	ppp bridge networl control	[RFC1474]

Prefix: iso.org.dod.internet.mgmt.mib-2.application (1.3.6.1.2.1.27)

(1.3.6.1.2.1.27.2.1.3)

```
   assocApplicationProtocol OBJECT-TYPE
       SYNTAX OBJECT IDENTIFIER
       MAX-ACCESS read-only
       STATUS current
       DESCRIPTION
         "An identification of the protocol being used for the
          application.  For an OSI Application, this will be the
          Application Context.  For Internet applications, the IANA
          maintains a registry of the OIDs which correspond to
          well-known applications.  If the application protocol is
          not listed in the registry, an OID value of the form
          {applTCPProtoID port} or {applUDProtoID port} are used for
          TCP-based and UDP-based protocols, respectively. In either
          case 'port' corresponds to the primary port number being
          used by the protocol."
       ::= {assocEntry 3}
```

Decimal	Name	Description
0	Reserved	

(1.3.6.1.2.1.27.3)

(1.3.6.1.2.1.27.4)

```
   -- OIDs of the form {applTCPProtoID port} are intended to be used
   -- for TCP-based protocols that don't have OIDs assigned by other
   -- means. {applUDPProtoID port} serves the same purpose for
   -- UDP-based protocols. In either case 'port' corresponds to
   -- the primary port number being used by the protocol. For example,
   -- assuming no other OID is assigned for SMTP, an OID of
   -- {applTCPProtoID 25} could be used, since SMTP is a TCP-based
   -- protocol that uses port 25 as its primary port.
```

Prefix: iso.org.dod.internet.mgmt.mib-2.mta (1.3.6.1.2.1.28)

(1.3.6.1.2.1.28.2.1.24)

```
   mtaGroupMailProtocol OBJECT-TYPE
       SYNTAX OBJECT IDENTIFIER
       MAX-ACCESS read-only
       STATUS current
       DESCRIPTION
         "An identification of the protocol being used by this group.
         For an group employing OSI protocols, this will be the
         Application Context.  For Internet applications, the IANA
         maintains a registry of the OIDs which correspond to
         well-known message transfer protocols.  If the application
         protocol is not listed in the registry, an OID value of the
         form {applTCPProtoID port} or {applUDProtoID port} are used
         for TCP-based and UDP-based protocols, respectively.  In
         either case 'port' corresponds to the primary port number
         being used by the group.  applTCPProtoID and applUDPProtoID
         are defined in [5]."
       ::= {mtaGroupEntry 24}
```

Decimal	Name	Description
0	Reserved	

SMI Network Management Experimental Codes:

Prefix: iso.org.dod.internet.experimental (1.3.6.1.3.)

	Decimal	Name	Description	References
	0	Reserved		[JKR1]
	1	CLNS	ISO CLNS Objects	[GS2]
*	2	T1-Carrier	T1 Carrier Objects	[FB77]
*	3	IEEE802.3	Ethernet-like Objects	[JXC]
*	4	IEEE802.5	Token Ring-like Objects	[EXD]
*	5	DECNet-PHIV	DECNet Phase IV	[JXS2]
*	6	Interface	Generic Interface Objects	[KZM]

*	7	IEEE802.4	Token Bus-like Objects	[KZM]
*	8	FDDI	FDDI Objects	[JDC20]
	9	LANMGR-1	LAN Manager V1 Objects	[JXG1]
	10	LANMGR-TRAPS	LAN Manager Trap Objects	[JXG1]
	11	Views	SNMP View Objects	[CXD]
	12	SNMP-AUTH	SNMP Authentication Objects	[KZM]
*	13	BGP	Border Gateway Protocol	[SW159]
*	14	Bridge	Bridge MIB	[FB77]
*	15	DS3	DS3 Interface Type	[TXB]
*	16	SIP	SMDS Interface Protocol	[TXB]
*	17	Appletalk	Appletalk Networking	[SXW]
*	18	PPP	PPP Objects	[FJK2]
*	19	Character MIB	Character MIB	[BS221]
*	20	RS-232 MIB	RS-232 MIB	[BS221]
*	21	Parallel MIB	Parallel MIB	[BS221]
	22	atsign-proxy	Proxy via Community	[RXF]
*	23	OSPF	OSPF MIB	[FB77]
	24	Alert-Man	Alert-Man	[LS8]
	25	FDDI-Synoptics	FDDI-Synoptics	[DXP1]
*	26	Frame Relay	Frame Relay MIB	[CXB]
*	27	rmon	Remote Network Management MIB	[SXW]
	28	IDPR	IDPR MIB	[RAW44]
	29	HUBMIB	IEEE 802.3 Hub MIB	[DXM5]
	30	IPFWDTBLMIB	IP Forwarding Table MIB	[FB77]
	31	LATM MIB		[TXB]
	32	SONET MIB		[TXB]
	33	IDENT		[MTR]
	34	MIME-MHS		[MTR]
	35	MAUMIB	IEEE 802.3 Mau MIB	[DXM5]
	36	Host Resources	Host Resources MIB	[SXW]
	37	ISIS-MIB	Integrated ISIS protocol MIB	[CXG]
	38	Chassis	Chassis MIB	[JDC20]
	39	ups	ups	[JDC20]
	40	App-Mon	Application Monitoring MIB	[TXK]
	41	ATM UNI	ATM	[MXA1]
	42	FC	Fibre Channel	[JXC4]
*	43	DNS	Domain Name Service	[Rob Austein]
	44	X.25	X.25 MIB	[Dean Throop]
	45	Frame Relay Serv.	Frame Relay Service MIB	[Tracy Cox]
	46	Madman-Applications		[Ned Freed]
	47	Madman-MTA		[Ned Freed]
	48	Madman-DSA		[Ned Freed]
	49	Modem		[Steve Waldbusser]
	50	SNA NAU		[Deirdre Kostick]
	51	SDLC	SDLC	[Jeff Hilgeman]
	52	DNS	Domain Name Service	[Jon Saperia]
	53	network-objects	IP info ix X.500	[Johannsen]
	54	printmib		[Joel Gyllenskog]

```
     55   rdbmsmib                                  [Robert Purvey]
     56   sipMIB                                      [Tracy Brown]
     57   stIImib       ST-II protocol MIB          [Hartmut Wittig]
     58   802.5 SSR MIB 802.5 Station Source Routing MIB     [KZM]
```

  * = obsoleted

SMI Private Codes:

Prefix: iso.org.dod.internet.private (1.3.6.1.4)

Decimal	Name	Description	References
0	Reserved		[JKR1]
1	enterprise	private enterprises	[JKR1]

SMI Private Enterprise Codes:

Prefix: iso.org.dod.internet.private.enterprise (1.3.6.1.4.1)

See the file "enterprise-numbers".

SMI Security Codes:

Prefix: iso.org.dod.internet.security (1.3.6.1.5)

Decimal	Name	Description	References
0	Reserved		[JKR1]
1	kerberosV4	Kerberos version 4 objects	[1,BCN]
2	kerberosV5	Kerberos version 5 objects	[2,BCN]

SMI SNMPv2 Codes:

Prefix: iso.org.dod.internet.snmpv2 (1.3.6.1.6)

SMI mail Codes:

Prefix: iso.org.dod.internet.mail (1.3.6.1.7)

```
   1     mime-mhs
```

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/smi-numbers

PRIVATE ENTERPRISE NUMBERS

SMI Network Management Private Enterprise Codes:

Prefix: iso.org.dod.internet.private.enterprise (1.3.6.1.4.1)

This file is

ftp://ftp.isi.edu/in-notes/iana/assignments/enterprise-numbers

Decimal	Name	References
0	Reserved	Joyce K. Reynolds <jkrey@isi.edu>
1	Proteon	John A. Shriver <jas@PROTEON.COM>
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To request an assignment of an Enterprise Number send the complete company name, address, and phone number; and the contact's person complete name, address, phone number, and email mailbox in an email message to <iana-mib@isi.edu>.

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SGMP Vendor Specific Codes: [obsolete]

Prefix: 1,255,

Decimal	Name	References
0	Reserved	[JKR1]
1	Proteon	[JS18]
2	IBM	[JXR]
3	CMU	[SXW]
4	Unix	[MS9]
5	ACC	[AB20]
6	TWG	[MTR]
7	CAYMAN	[BXM2]
8	NYSERNET	[MS9]
9	cisco	[GS2]
10	BBN	[RH6]
11	Unassigned	[JKR1]
12	MIT	[JR35]
13-254	Unassigned	[JKR1]
255	Reserved	[JKR1]

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ADDRESS RESOLUTION PROTOCOL PARAMETERS

The Address Resolution Protocol (ARP) specified in [RFC826] has several parameters. The assigned values for these parameters are listed here.

REVERSE ADDRESS RESOLUTION PROTOCOL OPERATION CODES

The Reverse Address Resolution Protocol (RARP) specified in [RFC903] uses the "Reverse" codes below.

DYNAMIC REVERSE ARP

The Dynamic Reverse Address Resolution Protocol (DRARP) uses the "DRARP" codes below. For further information, contact: David Brownell (suneast!helium!db@Sun.COM).

INVERSE ADDRESS RESOULUTION PROTOCOL

The Inverse Address Resolution Protocol (IARP) specified in [RFC1293] uses the "InARP" codes below.

Assignments:

Number	Operation Code (op)	Reference
1	REQUEST	[RFC826]
2	REPLY	[RFC826]
3	request Reverse	[RFC903]
4	reply Reverse	[RFC903]
5	DRARP-Request	[David Brownell]
6	DRARP-Reply	[David Brownell]
7	DRARP-Error	[David Brownell]
8	InARP-Request	[RFC1293]
9	InARP-Reply	[RFC1293]
10	ARP-NAK	[Mark Laubach]

Number	Hardware Type (hrd)	References
1	Ethernet (10Mb)	[JBP]
2	Experimental Ethernet (3Mb)	[JBP]
3	Amateur Radio AX.25	[PXK]
4	Proteon ProNET Token Ring	[JBP]
5	Chaos	[GXP]
6	IEEE 802 Networks	[JBP]
7	ARCNET	[JBP]
8	Hyperchannel	[JBP]
9	Lanstar	[TU]

10	Autonet Short Address	[MXB1]
11	LocalTalk	[JKR1]
12	LocalNet (IBM PCNet or SYTEK LocalNET)	[JXM]
13	Ultra link	[RXD2]
14	SMDS	[GXC1]
15	Frame Relay	[AGM]
16	Asynchronous Transmission Mode (ATM)	[JXB2]
17	HDLC	[JBP]
18	Fibre Channel	[Yakov Rekhter]
19	Asynchronous Transmission Mode (ATM)	[Mark Laubach]
20	Serial Line	[JBP]
21	Asynchronous Transmission Mode (ATM)	[MXB1]

Protocol Type (pro)

Use the same codes as listed in the section called "Ethernet Numbers of Interest" (all hardware types use this code set for the protocol type).

REFERENCES

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[RFC903] Finlayson, R., Mann, T., Mogul, J., and M. Theimer, "A Reverse Address Resolution Protocol", STD 38, RFC 903, Stanford University, June 1984.

[RFC1293] Bradley, T., and C. Brown, "Inverse Address Resolution Protocol", RFC 1293, Wellfleet Communications, Inc., January 1992.

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/arp-parameters

IEEE 802 NUMBERS OF INTEREST

Some of the networks of all classes are IEEE 802 Networks. These systems may use a Link Service Access Point (LSAP) field in much the same way the MILNET uses the "link" field. Further, there is an extension of the LSAP header called the Sub-Network Access Protocol (SNAP).

The IEEE likes to describe numbers in binary in bit transmission order, which is the opposite of the big-endian order used throughout the Internet protocol documentation.

Assignments:

Link Service Access Point			Description	References
IEEE binary	Internet binary	decimal		
00000000	00000000	0	Null LSAP	[IEEE]
01000000	00000010	2	Indiv LLC Sublayer Mgt	[IEEE]
11000000	00000011	3	Group LLC Sublayer Mgt	[IEEE]
00100000	00000100	4	SNA Path Control	[IEEE]
01100000	00000110	6	Reserved (DOD IP)	[RFC768,JBP]
01110000	00001110	14	PROWAY-LAN	[IEEE]
01110010	01001110	78	EIA-RS 511	[IEEE]
01111010	01011110	94	ISI IP	[JBP]
01110001	10001110	142	PROWAY-LAN	[IEEE]
01010101	10101010	170	SNAP	[IEEE]
01111111	11111110	254	ISO CLNS IS 8473	[RFC926,JXJ]
11111111	11111111	255	Global DSAP	[IEEE]

These numbers (and others) are assigned by the IEEE Standards Office. The address is:

IEEE Registration Authority
c/o Iris Ringel
IEEE Standards Dept
445 Hoes Lane, P.O. Box 1331
Piscataway, NJ 08855-1331
Phone +1 908 562 3813
Fax: +1 908 562 1571

The fee is $1000 and it takes 10 working days after receipt of the request form and fee. They will not do anything via fax or phone.

At an ad hoc special session on "IEEE 802 Networks and ARP", held during the TCP Vendors Workshop (August 1986), an approach to a

consistent way to send DoD-IP datagrams and other IP related protocols (such as the Address Resolution Protocol (ARP)) on 802 networks was developed, using the SNAP extension (see [RFC1042]).

REFERENCES

[RFC768] Postel, J., "User Datagram Protocol", STD 6, RFC 768, USC/Information Sciences Institute, August 1980.

[RFC926] International Standards Organization, "Protocol for Providing the Connectionless-Mode Network Services", RFC 926, ISO, December 1984.

[RFC1042] Postel, J., and J. Reynolds, "A Standard for the Transmission of IP Datagrams over IEEE 802 Networks", STD 43, RFC 1042, USC/Information Sciences Institute, February 1988.

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/ieee-802-numbers

ETHER TYPES

Many of the networks of all classes are Ethernets (10Mb) or Experimental Ethernets (3Mb). These systems use a message "type" field in much the same way the ARPANET uses the "link" field.

If you need an Ether Type, contact:

Xerox Systems Institute
3400 Hillview Ave.
PO BOX 10034
Palo Alto, CA 94303

Phone: 415-813-7164
Contact: Fonda Lix Pallone

The following list of EtherTypes is contributed unverified information from various sources.

Assignments:

Ethernet		Exp. Ethernet		Description	References
decimal	Hex	decimal	octal		
000	0000-05DC	-	-	IEEE802.3 Length Field	[XEROX]
257	0101-01FF	-	-	Experimental	[XEROX]
512	0200	512	1000	XEROX PUP (see 0A00)	[8,XEROX]
513	0201	-	-	PUP Addr Trans (see 0A01)	[XEROX]
	0400			Nixdorf	[XEROX]
1536	0600	1536	3000	XEROX NS IDP	[133,XEROX]
	0660			DLOG	[XEROX]
	0661			DLOG	[XEROX]
2048	0800	513	1001	Internet IP (IPv4)	[105,JBP]
2049	0801	-	-	X.75 Internet	[XEROX]
2050	0802	-	-	NBS Internet	[XEROX]
2051	0803	-	-	ECMA Internet	[XEROX]
2052	0804	-	-	Chaosnet	[XEROX]
2053	0805	-	-	X.25 Level 3	[XEROX]
2054	0806	-	-	ARP	[88,JBP]
2055	0807	-	-	XNS Compatability	[XEROX]
2076	081C	-	-	Symbolics Private	[DCP1]
2184	0888-088A	-	-	Xyplex	[XEROX]
2304	0900	-	-	Ungermann-Bass net debugr	[XEROX]
2560	0A00	-	-	Xerox IEEE802.3 PUP	[XEROX]
2561	0A01	-	-	PUP Addr Trans	[XEROX]
2989	0BAD	-	-	Banyan Systems	[XEROX]
4096	1000	-	-	Berkeley Trailer nego	[XEROX]
4097	1001-100F	-	-	Berkeley Trailer encap/IP	[XEROX]

5632	1600	-	-	Valid Systems	[XEROX]
16962	4242	-	-	PCS Basic Block Protocol	[XEROX]
21000	5208	-	-	BBN Simnet	[XEROX]
24576	6000	-	-	DEC Unassigned (Exp.)	[XEROX]
24577	6001	-	-	DEC MOP Dump/Load	[XEROX]
24578	6002	-	-	DEC MOP Remote Console	[XEROX]
24579	6003	-	-	DEC DECNET Phase IV Route	[XEROX]
24580	6004	-	-	DEC LAT	[XEROX]
24581	6005	-	-	DEC Diagnostic Protocol	[XEROX]
24582	6006	-	-	DEC Customer Protocol	[XEROX]
24583	6007	-	-	DEC LAVC, SCA	[XEROX]
24584	6008-6009	-	-	DEC Unassigned	[XEROX]
24586	6010-6014	-	-	3Com Corporation	[XEROX]
28672	7000	-	-	Ungermann-Bass download	[XEROX]
28674	7002	-	-	Ungermann-Bass dia/loop	[XEROX]
28704	7020-7029	-	-	LRT	[XEROX]
28720	7030	-	-	Proteon	[XEROX]
28724	7034	-	-	Cabletron	[XEROX]
32771	8003	-	-	Cronus VLN	[131,DT15]
32772	8004	-	-	Cronus Direct	[131,DT15]
32773	8005	-	-	HP Probe	[XEROX]
32774	8006	-	-	Nestar	[XEROX]
32776	8008	-	-	AT&T	[XEROX]
32784	8010	-	-	Excelan	[XEROX]
32787	8013	-	-	SGI diagnostics	[AXC]
32788	8014	-	-	SGI network games	[AXC]
32789	8015	-	-	SGI reserved	[AXC]
32790	8016	-	-	SGI bounce server	[AXC]
32793	8019	-	-	Apollo Computers	[XEROX]
32815	802E	-	-	Tymshare	[XEROX]
32816	802F	-	-	Tigan, Inc.	[XEROX]
32821	8035	-	-	Reverse ARP	[48,JXM]
32822	8036	-	-	Aeonic Systems	[XEROX]
32824	8038	-	-	DEC LANBridge	[XEROX]
32825	8039-803C	-	-	DEC Unassigned	[XEROX]
32829	803D	-	-	DEC Ethernet Encryption	[XEROX]
32830	803E	-	-	DEC Unassigned	[XEROX]
32831	803F	-	-	DEC LAN Traffic Monitor	[XEROX]
32832	8040-8042	-	-	DEC Unassigned	[XEROX]
32836	8044	-	-	Planning Research Corp.	[XEROX]
32838	8046	-	-	AT&T	[XEROX]
32839	8047	-	-	AT&T	[XEROX]
32841	8049	-	-	ExperData	[XEROX]
32859	805B	-	-	Stanford V Kernel exp.	[XEROX]
32860	805C	-	-	Stanford V Kernel prod.	[XEROX]
32861	805D	-	-	Evans & Sutherland	[XEROX]
32864	8060	-	-	Little Machines	[XEROX]
32866	8062	-	-	Counterpoint Computers	[XEROX]

32869	8065	-	-	Univ. of Mass. @ Amherst	[XEROX]
32870	8066	-	-	Univ. of Mass. @ Amherst	[XEROX]
32871	8067	-	-	Veeco Integrated Auto.	[XEROX]
32872	8068	-	-	General Dynamics	[XEROX]
32873	8069	-	-	AT&T	[XEROX]
32874	806A	-	-	Autophon	[XEROX]
32876	806C	-	-	ComDesign	[XEROX]
32877	806D	-	-	Computgraphic Corp.	[XEROX]
32878	806E-8077	-	-	Landmark Graphics Corp.	[XEROX]
32890	807A	-	-	Matra	[XEROX]
32891	807B	-	-	Dansk Data Elektronik	[XEROX]
32892	807C	-	-	Merit Internodal	[HWB]
32893	807D-807F	-	-	Vitalink Communications	[XEROX]
32896	8080	-	-	Vitalink TransLAN III	[XEROX]
32897	8081-8083	-	-	Counterpoint Computers	[XEROX]
32923	809B	-	-	Appletalk	[XEROX]
32924	809C-809E	-	-	Datability	[XEROX]
32927	809F	-	-	Spider Systems Ltd.	[XEROX]
32931	80A3	-	-	Nixdorf Computers	[XEROX]
32932	80A4-80B3	-	-	Siemens Gammasonics Inc.	[XEROX]
32960	80C0-80C3	-	-	DCA Data Exchange Cluster	[XEROX]
	80C4			Banyan Systems	[XEROX]
	80C5			Banyan Systems	[XEROX]

33100	814C	-	-	SNMP	[JKR1]
	814D			BIIN	[XEROX]
	814E			BIIN	[XEROX]
	814F			Technically Elite Concept	[XEROX]
	8150			Rational Corp	[XEROX]
	8151-8153			Qualcomm	[XEROX]
	815C-815E			Computer Protocol Pty Ltd	[XEROX]
	8164-8166			Charles River Data System	[XEROX]
	817D-818C			Protocol Engines	[XEROX]
	818D			Motorola Computer	[XEROX]
	819A-81A3			Qualcomm	[XEROX]
	81A4			ARAI Bunkichi	[XEROX]
	81A5-81AE			RAD Network Devices	[XEROX]
	81B7-81B9			Xyplex	[XEROX]
	81CC-81D5			Apricot Computers	[XEROX]
	81D6-81DD			Artisoft	[XEROX]
	81E6-81EF			Polygon	[XEROX]
	81F0-81F2			Comsat Labs	[XEROX]
	81F3-81F5			SAIC	[XEROX]
	81F6-81F8			VG Analytical	[XEROX]
	8203-8205			Quantum Software	[XEROX]
	8221-8222			Ascom Banking Systems	[XEROX]
	823E-8240			Advanced Encryption Syste	[XEROX]
	827F-8282			Athena Programming	[XEROX]
	8263-826A			Charles River Data System	[XEROX]
	829A-829B			Inst Ind Info Tech	[XEROX]
	829C-82AB			Taurus Controls	[XEROX]
	82AC-8693			Walker Richer & Quinn	[XEROX]
	8694-869D			Idea Courier	[XEROX]
	869E-86A1			Computer Network Tech	[XEROX]
	86A3-86AC			Gateway Communications	[XEROX]
	86DB			SECTRA	[XEROX]
	86DE			Delta Controls	[XEROX]
34543	86DF	-	-	ATOMIC	[JBP]
	86E0-86EF			Landis & Gyr Powers	[XEROX]
	8700-8710			Motorola	[XEROX]
	8A96-8A97			Invisible Software	[XEROX]
36864	9000	-	-	Loopback	[XEROX]
36865	9001	-	-	3Com(Bridge) XNS Sys Mgmt	[XEROX]
36866	9002	-	-	3Com(Bridge) TCP-IP Sys	[XEROX]
36867	9003	-	-	3Com(Bridge) loop detect	[XEROX]
65280	FF00	-	-	BBN VITAL-LanBridge cache	[XEROX]
	FF00-FF0F			ISC Bunker Ramo	[XEROX]

The standard for transmission of IP datagrams over Ethernets and Experimental Ethernets is specified in [RFC894] and [RFC895] respectively.

NOTE: Ethernet 48-bit address blocks are assigned by the IEEE.

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445 Hoes Lane, P.O. Box 1331
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IANA ETHERNET ADDRESS BLOCK

The IANA owns an Ethernet address block which may be used for multicast address asignments or other special purposes.

The address block in IEEE binary is: 0000 0000 0000 0000 0111 1010

In the normal Internet dotted decimal notation this is 0.0.94 since the bytes are transmitted higher order first and bits within bytes are transmitted lower order first (see "Data Notation" in the Introduction).

IEEE CSMA/CD and Token Bus bit transmission order: 00 00 5E

IEEE Token Ring bit transmission order: 00 00 7A

Appearance on the wire (bits transmitted from left to right):

```
    0                           23                              47
    |                           |                               |
    1000 0000 0000 0000 0111 1010 xxxx xxx0 xxxx xxxx xxxx xxxx
    |                                 |
    Multicast Bit                     0 = Internet Multicast
                                      1 = Assigned by IANA for
                                          other uses
```

Appearance in memory (bits transmitted right-to-left within octets, octets transmitted left-to-right):

```
    0                           23                              47
    |                           |                               |
    0000 0001 0000 0000 0101 1110 0xxx xxxx xxxx xxxx xxxx xxxx
            |                     |
            Multicast Bit         0 = Internet Multicast
```

1 = Assigned by IANA for other uses

The latter representation corresponds to the Internet standard bit-order, and is the format that most programmers have to deal with. Using this representation, the range of Internet Multicast addresses is:

01-00-5E-00-00-00 to 01-00-5E-7F-FF-FF in hex, or

1.0.94.0.0.0 to 1.0.94.127.255.255 in dotted decimal

ETHERNET VENDOR ADDRESS COMPONENTS

Ethernet hardware addresses are 48 bits, expressed as 12 hexadecimal digits (0-9, plus A-F, capitalized). These 12 hex digits consist of the first/left 6 digits (which should match the vendor of the Ethernet interface within the station) and the last/right 6 digits which specify the interface serial number for that interface vendor.

Ethernet addresses might be written unhyphenated (e.g., 123456789ABC), or with one hyphen (e.g., 123456-789ABC), but should be written hyphenated by octets (e.g., 12-34-56-78-9A-BC).

These addresses are physical station addresses, not multicast nor broadcast, so the second hex digit (reading from the left) will be even, not odd.

At present, it is not clear how the IEEE assigns Ethernet block addresses. Whether in blocks of 2**24 or 2**25, and whether multicasts are assigned with that block or separately. A portion of the vendor block address is reportedly assigned serially, with the other portion intentionally assigned randomly. If there is a global algorithm for which addresses are designated to be physical (in a chipset) versus logical (assigned in software), or globally-assigned versus locally-assigned addresses, some of the known addresses do not follow the scheme (e.g., AA0003; 02xxxx).

00000C Cisco
00000E Fujitsu
00000F NeXT
000010 Sytek
00001D Cabletron
000020 DIAB (Data Intdustrier AB)
000022 Visual Technology
00002A TRW

```
000032  GPT Limited (reassigned from GEC Computers Ltd)
00005A  S & Koch
00005E  IANA
000065  Network General
00006B  MIPS
000077  MIPS
00007A  Ardent
000089  Cayman Systems  Gatorbox
000093  Proteon
00009F  Ameristar Technology
0000A2  Wellfleet
0000A3  Network Application Technology
0000A6  Network General (internal assignment, not for products)
0000A7  NCD             X-terminals
0000A9  Network Systems
0000AA  Xerox           Xerox machines
0000B3  CIMLinc
0000B7  Dove            Fastnet
0000BC  Allen-Bradley
0000C0  Western Digital
0000C5  Farallon phone net card
0000C6  HP Intelligent Networks Operation (formerly Eon Systems)
0000C8  Altos
0000C9  Emulex          Terminal Servers
0000D7  Dartmouth College (NED Router)
0000D8  3Com? Novell?   PS/2
0000DD  Gould
0000DE  Unigraph
0000E2  Acer Counterpoint
0000EF  Alantec
0000FD  High Level Hardvare (Orion, UK)
000102  BBN             BBN internal usage (not registered)
0020AF  3COM ???
001700  Kabel
008064  Wyse Technology / Link Technologies
00802B  IMAC ???
00802D  Xylogics, Inc.  Annex terminal servers
00808C  Frontier Software Development
0080C2  IEEE 802.1 Committee
0080D3  Shiva
00AA00  Intel
00DD00  Ungermann-Bass
00DD01  Ungermann-Bass
020701  Racal InterLan
020406  BBN             BBN internal usage (not registered)
026086  Satelcom MegaPac (UK)
02608C  3Com            IBM PC; Imagen; Valid; Cisco
02CF1F  CMC             Masscomp; Silicon Graphics; Prime EXL
```

080002	3Com (Formerly Bridge)	
080003	ACC (Advanced Computer Communications)	
080005	Symbolics	Symbolics LISP machines
080008	BBN	
080009	Hewlett-Packard	
08000A	Nestar Systems	
08000B	Unisys	
080011	Tektronix, Inc.	
080014	Excelan	BBN Butterfly, Masscomp, Silicon Graphics
080017	NSC	
08001A	Data General	
08001B	Data General	
08001E	Apollo	
080020	Sun	Sun machines
080022	NBI	
080025	CDC	
080026	Norsk Data (Nord)	
080027	PCS Computer Systems GmbH	
080028	TI	Explorer
08002B	DEC	
08002E	Metaphor	
08002F	Prime Computer	Prime 50-Series LHC300
080036	Intergraph	CAE stations
080037	Fujitsu-Xerox	
080038	Bull	
080039	Spider Systems	
080041	DCA Digital Comm. Assoc.	
080045	???? (maybe Xylogics, but they claim not to know this number)	
080046	Sony	
080047	Sequent	
080049	Univation	
08004C	Encore	
08004E	BICC	
080056	Stanford University	
080058	???	DECsystem-20
08005A	IBM	
080067	Comdesign	
080068	Ridge	
080069	Silicon Graphics	
08006E	Concurrent	Masscomp
080075	DDE (Danish Data Elektronik A/S)	
08007C	Vitalink	TransLAN III
080080	XIOS	
080086	Imagen/QMS	
080087	Xyplex	terminal servers
080089	Kinetics	AppleTalk-Ethernet interface
08008B	Pyramid	
08008D	XyVision	XyVision machines

080090	Retix Inc	Bridges
484453	HDS ???	
800010	AT&T	
AA0000	DEC	obsolete
AA0001	DEC	obsolete
AA0002	DEC	obsolete
AA0003	DEC	Global physical address for some DEC machines
AA0004	DEC	Local logical address for systems running DECNET

ETHERNET MULTICAST ADDRESSES

An Ethernet multicast address consists of the multicast bit, the 23-bit vendor component, and the 24-bit group identifier assigned by the vendor. For example, DEC is assigned the vendor component 08-00-2B, so multicast addresses assigned by DEC have the first 24-bits 09-00-2B (since the multicast bit is the low-order bit of the first byte, which is "the first bit on the wire").

Ethernet Address	Type Field	Usage
Multicast Addresses:		
01-00-5E-00-00-00- 01-00-5E-7F-FF-FF	0800	Internet Multicast [RFC1112]
01-00-5E-80-00-00- 01-00-5E-FF-FF-FF	????	Internet reserved by IANA
01-80-C2-00-00-00	-802-	Spanning tree (for bridges)
09-00-02-04-00-01?	8080?	Vitalink printer
09-00-02-04-00-02?	8080?	Vitalink management
09-00-09-00-00-01	8005	HP Probe
09-00-09-00-00-01	-802-	HP Probe
09-00-09-00-00-04	8005?	HP DTC
09-00-1E-00-00-00	8019?	Apollo DOMAIN
09-00-2B-00-00-00	6009?	DEC MUMPS?
09-00-2B-00-00-01	8039?	DEC DSM/DTP?
09-00-2B-00-00-02	803B?	DEC VAXELN?
09-00-2B-00-00-03	8038	DEC Lanbridge Traffic Monitor (LTM)
09-00-2B-00-00-04	????	DEC MAP End System Hello
09-00-2B-00-00-05	????	DEC MAP Intermediate System Hello
09-00-2B-00-00-06	803D?	DEC CSMA/CD Encryption?
09-00-2B-00-00-07	8040?	DEC NetBios Emulator?
09-00-2B-00-00-0F	6004	DEC Local Area Transport (LAT)
09-00-2B-00-00-1x	????	DEC Experimental
09-00-2B-01-00-00	8038	DEC LanBridge Copy packets

		(All bridges)
09-00-2B-01-00-01	8038	DEC LanBridge Hello packets (All local bridges) 1 packet per second, sent by the designated LanBridge
09-00-2B-02-00-00	????	DEC DNA Lev. 2 Routing Layer routers?
09-00-2B-02-01-00	803C?	DEC DNA Naming Service Advertisement?
09-00-2B-02-01-01	803C?	DEC DNA Naming Service Solicitation?
09-00-2B-02-01-02	803E?	DEC DNA Time Service?
09-00-2B-03-xx-xx	????	DEC default filtering by bridges?
09-00-2B-04-00-00	8041?	DEC Local Area Sys. Transport (LAST)?
09-00-2B-23-00-00	803A?	DEC Argonaut Console?
09-00-4E-00-00-02?	8137?	Novell IPX
09-00-56-00-00-00- 09-00-56-FE-FF-FF	????	Stanford reserved
09-00-56-FF-00-00- 09-00-56-FF-FF-FF	805C	Stanford V Kernel, version 6.0
09-00-77-00-00-01	????	Retix spanning tree bridges
09-00-7C-02-00-05	8080?	Vitalink diagnostics
09-00-7C-05-00-01	8080?	Vitalink gateway?
0D-1E-15-BA-DD-06	????	HP
AB-00-00-01-00-00	6001	DEC Maintenance Operation Protocol (MOP) Dump/Load Assistance
AB-00-00-02-00-00	6002	DEC Maintenance Operation Protocol (MOP) Remote Console 1 System ID packet every 8-10 minutes, by every: DEC LanBridge DEC DEUNA interface DEC DELUA interface DEC DEQNA interface (in a certain mode)
AB-00-00-03-00-00	6003	DECNET Phase IV end node Hello packets 1 packet every 15 seconds, sent by each DECNET host
AB-00-00-04-00-00	6003	DECNET Phase IV Router Hello packets 1 packet every 15 seconds, sent by the DECNET router
AB-00-00-05-00-00 AB-00-03-FF-FF-FF	????	Reserved DEC through
AB-00-03-00-00-00	6004	DEC Local Area Transport (LAT) - old
AB-00-04-00-xx-xx	????	Reserved DEC customer private use
AB-00-04-01-xx-yy	6007	DEC Local Area VAX Cluster groups Sys. Communication Architecture (SCA)
CF-00-00-00-00-00	9000	Ethernet Configuration Test protocol (Loopback)

Broadcast Address:

FF-FF-FF-FF-FF-FF	0600	XNS packets, Hello or gateway search? 6 packets every 15 seconds, per XNS station
FF-FF-FF-FF-FF-FF	0800	IP (e.g. RWHOD via UDP) as needed
FF-FF-FF-FF-FF-FF	0804	CHAOS
FF-FF-FF-FF-FF-FF	0806	ARP (for IP and CHAOS) as needed
FF-FF-FF-FF-FF-FF	0BAD	Banyan
FF-FF-FF-FF-FF-FF	1600	VALID packets, Hello or gateway search? 1 packets every 30 seconds, per VALID station
FF-FF-FF-FF-FF-FF	8035	Reverse ARP
FF-FF-FF-FF-FF-FF	807C	Merit Internodal (INP)
FF-FF-FF-FF-FF-FF	809B	EtherTalk

REFERENCES

[RFC894] Hornig, C., "A Standard for the Transmission of IP Datagrams over Ethernet Networks, STD 41, RFC 894, Symbolics, April 1984.

[RFC895] Postel, J., "A Standard for the Transmission of IP Datagrams over Experimental Ethernet Networks, STD 42, RFC 895, USC/Information Sciences Institute, April 1984.

[RFC1112] Deeering, S., "Host Extensions for IP Multicasting", STD 5, RFC 1112, Stanford University, August 1989.

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[]

URL = ftp://ftp.isi.edu/in-notes/iana/assignments/ethernet-numbers

X.25 TYPE NUMBERS

CCITT defines the high order two bits of the first octet of call user data as follows:

00 - Used for other CCITT recomendations (such as X.29)
01 - Reserved for use by "national" administrative authorities
10 - Reserved for use by international administrative authoorities
11 - Reserved for arbitrary use between consenting DTEs

Call User Data (hex)	Protocol	Reference
01	PAD	[GS2]
C5	Blacker front-end descr dev	[AGM]
CC	IP	[RFC877,AGM]*
CD	ISO-IP	[AGM]
CF	PPP	[RFC1598]
DD	Network Monitoring	[AGM]

*NOTE: ISO SC6/WG2 approved assignment in ISO 9577 (January 1990).

REFERENCES

[RFC877] Korb, J., "A Standard for the Transmission of IP Datagrams Over Public Data Networks", RFC 877, Purdue University, September 1983.

[RFC1598] Simpson, W., "PPPin X.25", RFC 1598, Daydreamer, March 1994.

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/x25-type-numbers

PUBLIC DATA NETWORK NUMBERS

One of the Internet Class A Networks is the international system of Public Data Networks. This section lists the mapping between the Internet Addresses and the Public Data Network Addresses (X.121).

Assignments:

Internet	Public Data Net	Description	References
014.000.000.000		Reserved	[JBP]
014.000.000.001	3110-317-00035 00	PURDUE-TN	[TN]
014.000.000.002	3110-608-00027 00	UWISC-TN	[TN]
014.000.000.003	3110-302-00024 00	UDEL-TN	[TN]
014.000.000.004	2342-192-00149 23	UCL-VTEST	[PK]
014.000.000.005	2342-192-00300 23	UCL-TG	[PK]
014.000.000.006	2342-192-00300 25	UK-SATNET	[PK]
014.000.000.007	3110-608-00024 00	UWISC-IBM	[MS56]
014.000.000.008	3110-213-00045 00	RAND-TN	[MO2]
014.000.000.009	2342-192-00300 23	UCL-CS	[PK]
014.000.000.010	3110-617-00025 00	BBN-VAN-GW	[JD21]
014.000.000.011	2405-015-50300 00	CHALMERS	[UXB]
014.000.000.012	3110-713-00165 00	RICE	[PAM6]
014.000.000.013	3110-415-00261 00	DECWRL	[PAM6]
014.000.000.014	3110-408-00051 00	IBM-SJ	[SXA3]
014.000.000.015	2041-117-01000 00	SHAPE	[JFW]
014.000.000.016	2628-153-90075 00	DFVLR4-X25	[GB7]
014.000.000.017	3110-213-00032 00	ISI-VAN-GW	[JD21]
014.000.000.018	2624-522-80900 52	FGAN-SIEMENS-X25	[GB7]
014.000.000.019	2041-170-10000 00	SHAPE-X25	[JFW]
014.000.000.020	5052-737-20000 50	UQNET	[AXH]
014.000.000.021	3020-801-00057 50	DMC-CRC1	[VXT]
014.000.000.022	2624-522-80329 02	FGAN-FGANFFMVAX-X25	[GB7]
014.000.000.023	2624-589-00908 01	ECRC-X25	[PXD]
014.000.000.024	2342-905-24242 83	UK-MOD-RSRE	[JXE2]
014.000.000.025	2342-905-24242 82	UK-VAN-RSRE	[AXM]
014.000.000.026	2624-522-80329 05	DFVLRSUN-X25	[GB7]
014.000.000.027	2624-457-11015 90	SELETFMSUN-X25	[BXD]
014.000.000.028	3110-408-00146 00	CDC-SVL	[RAM57]
014.000.000.029	2222-551-04400 00	SUN-CNUCE	[ABB2]
014.000.000.030	2222-551-04500 00	ICNUCEVM-CNUCE	[ABB2]
014.000.000.031	2222-551-04600 00	SPARE-CNUCE	[ABB2]
014.000.000.032	2222-551-04700 00	ICNUCEVX-CNUCE	[ABB2]
014.000.000.033	2222-551-04524 00	CISCO-CNUCE	[ABB2]
014.000.000.034	2342-313-00260 90	SPIDER-GW	[AD67]

014.000.000.035	2342-313-00260 91	SPIDER-EXP	[AD67]
014.000.000.036	2342-225-00101 22	PRAXIS-X25A	[TXR]
014.000.000.037	2342-225-00101 23	PRAXIS-X25B	[TXR]
014.000.000.038	2403-712-30250 00	DIAB-TABY-GW	[FXB]
014.000.000.039	2403-715-30100 00	DIAB-LKP-GW	[FXB]
014.000.000.040	2401-881-24038 00	DIAB-TABY1-GW	[FXB]
014.000.000.041	2041-170-10060 00	STC	[TC27]
014.000.000.042	2222-551-00652 60	CNUCE	[TC27]
014.000.000.043	2422-510-05900 00	Tollpost-Globe AS	[OXG]
014.000.000.044	2422-670-08900 00	Tollpost-Globe AS	[OXG]
014.000.000.045	2422-516-01000 00	Tollpost-Globe AS	[OXG]
014.000.000.046	2422-450-00800 00	Tollpost-Globe AS	[OXG]
014.000.000.047	2422-610-00200 00	Tollpost-Globe AS	[OXG]
014.000.000.048	2422-310-00300 00	Tollpost-Globe AS	[OXG]
014.000.000.049	2422-470-08800 00	Tollpost-Globe AS	[OXG]
014.000.000.050	2422-210-04600 00	Tollpost-Globe AS	[OXG]
014.000.000.051	2422-130-28900 00	Tollpost-Globe AS	[OXG]
014.000.000.052	2422-310-27200 00	Tollpost-Globe AS	[OXG]
014.000.000.053	2422-250-05800 00	Tollpost-Globe AS	[OXG]
014.000.000.054	2422-634-05900 00	Tollpost-Globe AS	[OXG]
014.000.000.055	2422-670-08800 00	Tollpost-Globe AS	[OXG]
014.000.000.056	2422-430-07400 00	Tollpost-Globe AS	[OXG]
014.000.000.057	2422-674-07800 00	Tollpost-Globe AS	[OXG]
014.000.000.058	2422-230-16900 00	Tollpost-Globe AS	[OXG]
014.000.000.059	2422-518-02900 00	Tollpost-Globe AS	[OXG]
014.000.000.060	2422-370-03100 00	Tollpost-Globe AS	[OXG]
014.000.000.061	2422-516-03400 00	Tollpost-Globe AS	[OXG]
014.000.000.062	2422-616-04400 00	Tollpost-Globe AS	[OXG]
014.000.000.063	2422-650-23500 00	Tollpost-Globe AS	[OXG]
014.000.000.064	2422-330-02500 00	Tollpost-Globe AS	[OXG]
014.000.000.065	2422-350-01900 00	Tollpost-Globe AS	[OXG]
014.000.000.066	2422-410-00700 00	Tollpost-Globe AS	[OXG]
014.000.000.067	2422-539-06200 00	Tollpost-Globe AS	[OXG]
014.000.000.068	2422-630-07200 00	Tollpost-Globe AS	[OXG]
014.000.000.069	2422-470-12300 00	Tollpost-Globe AS	[OXG]
014.000.000.070	2422-470-13000 00	Tollpost-Globe AS	[OXG]
014.000.000.071	2422-170-04600 00	Tollpost-Globe AS	[OXG]
014.000.000.072	2422-516-04300 00	Tollpost-Globe AS	[OXG]
014.000.000.073	2422-530-00700 00	Tollpost-Globe AS	[OXG]
014.000.000.074	2422-650-18800 00	Tollpost-Globe AS	[OXG]
014.000.000.075	2422-450-24500 00	Tollpost-Globe AS	[OXG]
014.000.000.076	2062-243-15631 00	DPT-BXL-DDC	[LZ15]
014.000.000.077	2062-243-15651 00	DPT-BXL-DDC2	[LZ15]
014.000.000.078	3110-312-00431 00	DPT-CHI	[LZ15]
014.000.000.079	3110-512-00135 00	DPT-SAT-ENG	[LZ15]
014.000.000.080	2080-941-90550 00	DPT-PAR	[LZ15]
014.000.000.081	4545-511-30600 00	DPT-PBSC	[LZ15]
014.000.000.082	4545-513-30900 00	DPT-HONGKONG	[LZ15]

014.000.000.083	4872-203-55000 00	UECI-TAIPEI	[LZ15]
014.000.000.084	2624-551-10400 20	DPT-HANOVR	[LZ15]
014.000.000.085	2624-569-00401 99	DPT-FNKFRT	[LZ15]
014.000.000.086	3110-512-00134 00	DPT-SAT-SUPT	[LZ15]
014.000.000.087	4602-3010-0103 20	DU-X25A	[JK64]
014.000.000.088	4602-3010-0103 21	FDU-X25B	[JK64]
014.000.000.089	2422-150-33700 00	Tollpost-Globe AS	[OXG]
014.000.000.090	2422-271-07100 00	Tollpost-Globe AS	[OXG]
014.000.000.091	2422-516-00100 00	Tollpost-Globe AS	[OXG]
014.000.000.092	2422-650-18800 00	Norsk Informas.	[OXG]
014.000.000.093	2422-250-30400 00	Tollpost-Globe AS	[OXG]
014.000.000.094		Leissner Data AB	[PXF1]
014.000.000.095		Leissner Data AB	[PXF1]
014.000.000.096		Leissner Data AB	[PXF1]
014.000.000.097		Leissner Data AB	[PXF1]
014.000.000.098		Leissner Data AB	[PXF1]
014.000.000.099		Leissner Data AB	[PXF1]
014.000.000.100		Leissner Data AB	[PXF1]
014.000.000.101		Leissner Data AB	[PXF1]
014.000.000.102		Leissner Data AB	[PXF1]
014.000.000.103		Leissner Data AB	[PXF1]
014.000.000.104		Leissner Data AB	[PXF1]
014.000.000.105		Leissner Data AB	[PXF1]
014.000.000.106		Leissner Data AB	[PXF1]
014.000.000.107		Leissner Data AB	[PXF1]
014.000.000.108		Leissner Data AB	[PXF1]
014.000.000.109		Leissner Data AB	[PXF1]
014.000.000.110		Leissner Data AB	[PXF1]
014.000.000.111		Leissner Data AB	[PXF1]
014.000.000.112		Leissner Data AB	[PXF1]
014.000.000.113		Leissner Data AB	[PXF1]
014.000.000.114		Leissner Data AB	[PXF1]
014.000.000.115		Leissner Data AB	[PXF1]
014.000.000.116		Leissner Data AB	[PXF1]
014.000.000.117		Leissner Data AB	[PXF1]
014.000.000.118		Leissner Data AB	[PXF1]
014.000.000.119		Leissner Data AB	[PXF1]
014.000.000.120		Leissner Data AB	[PXF1]
014.000.000.121		Leissner Data AB	[PXF1]
014.000.000.122		Leissner Data AB	[PXF1]
014.000.000.123		Leissner Data AB	[PXF1]
014.000.000.124		Leissner Data AB	[PXF1]
014.000.000.125		Leissner Data AB	[PXF1]
014.000.000.126		Leissner Data AB	[PXF1]
014.000.000.127		Leissner Data AB	[PXF1]
014.000.000.128		Leissner Data AB	[PXF1]
014.000.000.129	2422-150-17900 00	Tollpost-Globe AS	[OXG]
014.000.000.130	2422-150-42700 00	Tollpost-Globe AS	[OXG]

014.000.000.131	2422-190-41900 00	T-G Airfreight AS [OXG]
014.000.000.132	2422-616-16100 00	Tollpost-Globe AS [OXG]
014.000.000.133	2422-150-50700-00	Tollpost-Globe Int. [OXG]
014.000.000.134	2422-190-28100-00	Intersped AS [OXG]
014.000.000.135-014.255.255.254		Unassigned [JBP]
014.255.255.255		Reserved [JBP]

The standard for transmission of IP datagrams over the Public Data Network is specified in RFC-1356 [69].

REFERENCES

[RFC877] Korb, J., "A Standard for the Transmission of IP Datagrams Over Public Data Networks", RFC 877, Purdue University, September 1983.

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/public-data-network-numbers

MILNET LINK NUMBERS

The word "link" here refers to a field in the original MILNET Host/IMP interface leader. The link was originally defined as an 8-bit field. Later specifications defined this field as the "message-id" with a length of 12 bits. The name link now refers to the high order 8 bits of this 12-bit message-id field. The Host/IMP interface is defined in BBN Report 1822 [BBN1822].

The low-order 4 bits of the message-id field are called the sub-link. Unless explicitly specified otherwise for a particular protocol, there is no sender to receiver significance to the sub-link. The sender may use the sub-link in any way he chooses (it is returned in the RFNM by the destination IMP), the receiver should ignore the sub-link.

Link Assignments:

Decimal	Description	References
0-63	BBNCC Monitoring	[MB]
64-149	Unassigned	[JBP]
150	Xerox NS IDP	[ETHERNET,XEROX]
151	Unassigned	[JBP]
152	PARC Universal Protocol	[PUP,XEROX]
153	TIP Status Reporting	[JGH]
154	TIP Accounting	[JGH]
155	Internet Protocol [regular]	[RFC791,JBP]
156-158	Internet Protocol [experimental]	[RFC791,JBP]
159	Figleaf Link	[JBW1]
160	Blacker Local Network Protocol	[DM28]
161-194	Unassigned	[JBP]
195	ISO-IP	[RFC926,RXM]
196-247	Experimental Protocols	[JBP]
248-255	Network Maintenance	[JGH]

MILNET LOGICAL ADDRESSES

The MILNET facility for "logical addressing" is described in [RFC878] and [RFC1005]. A portion of the possible logical addresses are reserved for standard uses.

There are 49,152 possible logical host addresses. Of these, 256 are reserved for assignment to well-known functions. Assignments for well-known functions are made by the IANA. Assignments for other

logical host addresses are made by the NIC.

Logical Address Assignments:

Decimal	Description	References
0	Reserved	[JBP]
1	The BBN Core Gateways	[MB]
2-254	Unassigned	[JBP]
255	Reserved	[JBP]

MILNET X.25 ADDRESS MAPPINGS

All MILNET hosts are assigned addresses by the Defense Data Network (DDN). The address of a MILNET host may be obtained from the Network Information Center (NIC), represented as an ASCII text string in what is called "host table format". This section describes the process by which MILNET X.25 addresses may be derived from addresses in the NIC host table format.

A NIC host table address consists of the ASCII text string representations of four decimal numbers separated by periods, corresponding to the four octeted of a thirty-two bit Internet address. The four decimal numbers are referred to in this section as "n", "h' "l", and "i". Thus, a host table address may be represented as: "n.h.l.i". Each of these four numbers will have either one, two, or three decimal digits and will never have a value greater than 255. For example, in the host table, address: "10.2.0.124", n=10, h=2, l=0, and i=124. To convert a host table address to a MILNET X.25 address:

1. If h < 64, the host table address corresponds to the X.25 physical address:

ZZZZ F IIIHHZZ (SS)

where:

ZZZZ = 0000 as required

F = 0 because the address is a physical address;

III is a three decimal digit respresentation of "i", right-adjusted and padded with leading

zeros if required;

HH is a two decimal digit representation of "h", right-adjusted and padded with leading zeros if required;

ZZ = 00 and

(SS) is optional

In the example given above, the host table address 10.2.0.124 corresponds to the X.25 physical address 000001240200.

2. If h > 64 or h = 64, the host table address corresponds to the X.25 logical address

ZZZZ F RRRRRZZ (SS)

where:

ZZZZ = 0000 as required

F = 1 because the address is a logical address;

RRRRR is a five decimal digit representation of the result "r" of the calculation

r = h * 256 + i

(Note that the decimal representation of "r" will always require five digits);

ZZ = 00 and

(SS) is optional

Thus, the host table address 10.83.0.207 corresponds to the X.25 logical address 000012145500.

In both cases, the "n" and "l" fields of the host table address are not used.

REFERENCES

[BBN1822] BBN, "Specifications for the Interconnection of a Host and

an IMP", Report 1822, Bolt Beranek and Newman, Cambridge, Massachusetts, revised, December 1981.

[ETHERNET] "The Ethernet, A Local Area Network: Data Link Layer and Physical Layer Specification", AA-K759B-TK, Digital Equipment Corporation, Maynard, MA. Also as: "The Ethernet - A Local Area Network", Version 1.0, Digital Equipment Corporation, Intel Corporation, Xerox Corporation, September 1980. And: "The Ethernet, A Local Area Network: Data Link Layer and Physical Layer Specifications", Digital, Intel and Xerox, November 1982. And: XEROX, "The Ethernet, A Local Area Network: Data Link Layer and Physical Layer Specification", X3T51/80-50, Xerox Corporation, Stamford, CT., October 1980.

[PUP] Boggs, D., J. Shoch, E. Taft, and R. Metcalfe, "PUP: An Internetwork Architecture", XEROX Palo Alto Research Center, CSL-79-10, July 1979; also in IEEE Transactions on Communication, Volume COM-28, Number 4, April 1980.

[RFC791] Postel, J., ed., "Internet Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 791, USC/Information Sciences Institute, September 1981.

[RFC878] Malis, Andrew, "The ARPANET 1822L Host Access Protocol", RFC 878, BBN Communications Corp., December 1983.

[RFC926] International Standards Organization, "Protocol for Providing the Connectionless-Mode Network Services", RFC 926, ISO, December 1984.

[RFC1005] Khanna, A., and A. Malis, "The ARPANET AHIP-E Host Access Protocol (Enhanced AHIP)", RFC 1005, BBN Communications Corp., May 1987.

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/milnet-parameters

XNS PROTOCOL TYPES

Assigned well-known socket numbers

Routing Information	1
Echo	2
Router Error	3
Experimental	40-77

Assigned internet packet types

Routing Information	1
Echo	2
Error	3
Packet Exchange	4
Sequenced Packet	5
PUP	12
DoD IP	13
Experimental	20-37

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/xns-protocol-types

INTERNET / XNS PROTOCOL MAPPINGS

Below are two tables describing the arrangement of protocol fields or type field assignments so that one could send XNS Datagrams on the MILNET or Internet Datagrams on 10Mb Ethernet, and also protocol and type fields so one could encapsulate each kind of Datagram in the other.

upper / lower	DoD IP	PUP	NS IP
3Mb Ethernet	Type 1001 octal	Type 1000 octal	Type 3000 octal
10 Mb Ethernet	Type 0800 hex	Type 0200 hex	Type 0600 hex
MILNET	Link 155 decimal	Link 152 decimal	Link 150 decimal

upper / lower	DoD IP	PUP	NS IP
DoD IP	X	Protocol 12 decimal	Protocol 22 decimal
PUP	?	X	?
NS IP	Type 13 decimal	Type 12 decimal	X

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/ip-xns-mapping

PRONET 80 TYPE NUMBERS

Below is the current list of PRONET 80 Type Numbers. Note: a protocol that is on this list does not necessarily mean that there is any implementation of it on ProNET.

Of these, protocols 1, 14, and 20 are the only ones that have ever been seen in ARP packets.

For reference, the header is (one byte/line):

```
        destination hardware address
        source hardware address
        data link header version (2)
        data link header protocol number
        data link header reserved (0)
        data link header reserved (0)
```

Some protocols have been known to tuck stuff in the reserved fields.

Those who need a protocol number on ProNET-10/80 should contact John Shriver (jas@proteon.com).

```
1       IP
2       IP with trailing headers
3       Address Resolution Protocol
4       Proteon HDLC
5       VAX Debugging Protocol (MIT)
10      Novell NetWare (IPX and pre-IPX) (old format,
        3 byte trailer)
11      Vianetix
12      PUP
13      Watstar protocol (University of Waterloo)
14      XNS
15      Diganostics
16      Echo protocol (link level)
17      Banyan Vines
20      DECnet (DEUNA Emulation)
21      Chaosnet
23      IEEE 802.2 or ISO 8802/2 Data Link
24      Reverse Address Resolution Protocol
29      TokenVIEW-10
31      AppleTalk LAP Data Packet
33      Cornell Boot Server Location Protocol
34      Novell NetWare IPX (new format, no trailer,
        new XOR checksum)
```

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/pronet80-type-numbers

NOVELL SAP NUMBERS OF INTEREST

For the convenience of the Internet community the IANA maitains a list of Novell Service Access Point (SAP) numbers. This list is kept up-to-date- by contributions from the community. Please send corrections and additions to IANA@ISI.EDU.

Novell SAPs
====== ====

Decimal	Hex	SAP Description
0	0000	Unknown
1	0001	User
2	0002	User Group
3	0003	Print Queue or Print Group
4	0004	File Server (SLIST source)
5	0005	Job Server
6	0006	Gateway
7	0007	Print Server or Silent Print Server
8	0008	Archive Queue
9	0009	Archive Server
10	000a	Job Queue
11	000b	Administration
15	000F	Novell TI-RPC
23	0017	Diagnostics
32	0020	NetBIOS
33	0021	NAS SNA Gateway
35	0023	NACS Async Gateway or Asynchronous Gateway
36	0024	Remote Bridge or Routing Service
38	0026	Bridge Server or Asynchronous Bridge Server
39	0027	TCP/IP Gateway Server
40	0028	Point to Point (Eicon) X.25 Bridge Server
41	0029	Eicon 3270 Gateway
42	002a	CHI Corp ???
44	002c	PC Chalkboard
45	002d	Time Synchronization Server or Asynchronous Timer
46	002e	SAP Archive Server or SMS Target Service Agent
69	0045	DI3270 Gateway
71	0047	Advertising Print Server
75	004b	Btrieve VAP/NLM 5.0
76	004c	Netware SQL VAP/NLM Server
77	004d	Xtree Network Version Netware XTree
80	0050	Btrieve VAP 4.11
82	0052	QuickLink (Cubix)
83	0053	Print Queue User
88	0058	Multipoint X.25 Eicon Router

96	0060	STLB/NLM ???
100	0064	ARCserve
102	0066	ARCserve 3.0
114	0072	WAN Copy Utility
122	007a	TES-Netware for VMS
146	0092	WATCOM Debugger or Emerald Tape Backup Server
149	0095	DDA OBGYN ???
152	0098	Netware Access Server (Asynchronous gateway)
154	009a	Netware for VMS II or Named Pipe Server
155	009b	Netware Access Server
158	009e	Portable Netware Server or SunLink NVT
161	00a1	Powerchute APC UPS NLM
170	00aa	LAWserve ???
172	00ac	Compaq IDA Status Monitor
256	0100	PIPE STAIL ???
258	0102	LAN Protect Bindery
259	0103	Oracle DataBase Server
263	0107	Netware 386 or RSPX Remote Console
271	010f	Novell SNA Gateway
274	0112	Print Server (HP)
276	0114	CSA MUX (f/Communications Executive)
277	0115	CSA LCA (f/Communications Executive)
278	0116	CSA CM (f/Communications Executive)
279	0117	CSA SMA (f/Communications Executive)
280	0118	CSA DBA (f/Communications Executive)
281	0119	CSA NMA (f/Communications Executive)
282	011a	CSA SSA (f/Communications Executive)
283	011b	CSA STATUS (f/Communications Executive)
286	011e	CSA APPC (f/Communications Executive)
294	0126	SNA TEST SSA Profile
298	012a	CSA TRACE (f/Communications Executive)
304	0130	Communications Executive
307	0133	NNS Domain Server or Netware Naming Services Domain
309	0135	Netware Naming Services Profile
311	0137	Netware 386 Print Queue or NNS Print Queue
321	0141	LAN Spool Server (Vap, Intel)
338	0152	IRMALAN Gateway
340	0154	Named Pipe Server
360	0168	Intel PICKIT Comm Server or Intel CAS Talk Server
369	171	UNKNOWN???
371	0173	Compaq
372	0174	Compaq SNMP Agent
373	0175	Compaq
384	0180	XTree Server or XTree Tools
394	18A	UNKNOWN??? Running on a Novell Server
432	01b0	GARP Gateway (net research)
433	01b1	Binfview (Lan Support Group)
447	01bf	Intel LanDesk Manager

458	01ca	AXTEC ???
459	01cb	Netmode ???
460	1CC	UNKNOWN??? Sheva netmodem???
472	01d8	Castelle FAXPress Server
474	01da	Castelle LANPress Print Server
476	1DC	Castille FAX/Xerox 7033 Fax Server/Excel Lan Fax
496	01f0	LEGATO ???
501	01f5	LEGATO ???
563	0233	NMS Agent or Netware Management Agent
567	0237	NMS IPX Discovery or LANtern Read/Write Channel
568	0238	NMS IP Discovery or LANtern Trap/Alarm Channel
570	023a	LABtern
572	023c	MAVERICK ???
574	23E	UNKNOWN??? Running on a Novell Server
575	023f	Used by eleven various Novell Servers
590	024e	Remote Something ???
618	026a	Network Management (NMS) Service Console
619	026b	Time Synchronization Server (Netware 4.x)
632	0278	Directory Server (Netware 4.x)
772	0304	Novell SAA Gateway
776	0308	COM or VERMED 1 ???
778	030a	Gallacticom BBS
780	030c	Intel Netport 2 or HP JetDirect or HP Quicksilver
800	0320	Attachmate Gateway
807	0327	Microsoft Diagnostiocs ???
821	0335	MultiTech Systems Multisynch Comm Server
853	0355	Arcada Backup Exec
858	0358	MSLCD1 ???
865	0361	NETINELO ???
894	037e	Twelve Novell file servers in the PC3M family
895	037f	ViruSafe Notify
902	0386	HP Bridge
903	0387	HP Hub
916	0394	NetWare SAA Gateway
923	039b	Lotus Notes
951	03b7	Certus Anti Virus NLM
964	03c4	ARCserve 4.0 (Cheyenne)
967	03c7	LANspool 3.5 (Intel)
990	03de	Gupta Sequel Base Server or NetWare SQL
993	03e1	Univel Unixware
996	03e4	Univel Unixware
1020	03fc	Intel Netport
1021	03fd	Print SErver Queue ???
1034	40A	ipnServer??? Running on a Novell Server
1035	40B	UNKNOWN???
1037	40D	LVERRMAN??? Running on a Novell Server
1038	40E	LVLIC??? Running on a Novell Server
1040	410	UNKNOWN??? Running on a Novell Server

1044	0414	Kyocera
1065	0429	Site Lock Virus (Brightworks)
1074	0432	UFHELP R ???
1075	433	Sunoptics SNMP Agent???
1100	044c	Backup ???
1111	457	Canon GP55??? Running on a Canon GP55 network printer
1115	045b	Dell SCSI Array (DSA) Monitor
1200	04b0	CD-Net (Meridian)
1217	4C1	UNKNOWN???
1299	513	Emulux NQA??? Something from Emulex
1312	0520	Site Lock Checks
1321	0529	Site Lock Checks (Brightworks)
1325	052d	Citrix OS/2 App Server
1344	536	Milan ???
1408	0580	McAfee's NetShield anti-virus
1569	621	?? Something from Emulex
1571	623	UNKNOWN??? Running on a Novell Server
1900	076C	Xerox
2857	0b29	Site Lock
3113	0c29	Site Lock Applications
3116	0c2c	Licensing Server
9088	2380	LAI Site Lock
9100	238c	Meeting Maker
18440	4808	Site Lock Server or Site Lock Metering VAP/NLM
21845	5555	Site Lock User
25362	6312	Tapeware
28416	6f00	Rabbit Gateway (3270)
30467	7703	MODEM??
32770	8002	NetPort Printers (Intel) or LANport
32776	8008	WordPerfect Network Version
34238	85BE	Cisco Enhanced Interior Routing Protocol (EIGRP)
34952	8888	WordPerfect Network Version or Quick Network Management
36864	9000	McAfee's NetShield anti-virus
38404	9604	?? CSA-NT_MON
61727	f11f	Site Lock Metering VAP/NLM
61951	f1ff	Site Lock
62723	F503	?? SCA-NT
65535	ffff	Any Service or Wildcard

This file is

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POINT-TO-POINT PROTOCOL FIELD ASSIGNMENTS

PPP DLL PROTOCOL NUMBERS

The Point-to-Point Protocol (PPP) Data Link Layer [146,147,175] contains a 16 bit Protocol field to identify the the encapsulated protocol. The Protocol field is consistent with the ISO 3309 (HDLC) extension mechanism for Address fields. All Protocols MUST be assigned such that the least significant bit of the most significant octet equals "0", and the least significant bit of the least significant octet equals "1".

Assigned PPP DLL Protocol Numbers

Value (in hex)	Protocol Name	
0001	Padding Protocol	
0003 to 001f	reserved (transparency inefficient)	
0021	Internet Protocol	
0023	OSI Network Layer	
0025	Xerox NS IDP	
0027	DECnet Phase IV	
0029	Appletalk	
002b	Novell IPX	
002d	Van Jacobson Compressed TCP/IP	
002f	Van Jacobson Uncompressed TCP/IP	
0031	Bridging PDU	
0033	Stream Protocol (ST-II)	
0035	Banyan Vines	
0037	reserved (until 1993)	
0039	AppleTalk EDDP	
003b	AppleTalk SmartBuffered	
003d	Multi-Link	
003f	NETBIOS Framing	
0041	Cisco Systems	
0043	Ascom Timeplex	
0045	Fujitsu Link Backup and Load Balancing (LBLB)	
0047	DCA Remote Lan	
0049	Serial Data Transport Protocol (PPP-SDTP)	
004b	SNA over 802.2	
004d	SNA	
004f	IP6 Header Compression	
006f	Stampede Bridging	
007d	reserved (Control Escape)	[RFC1661]
007f	reserved (compression inefficient)	[RFC1662]
00cf	reserved (PPP NLPID)	
00fb	compression on single link in multilink group	
00fd	1st choice compression	

00ff	reserved (compression inefficient)	
0201	802.1d Hello Packets	
0203	IBM Source Routing BPDU	
0205	DEC LANBridge100 Spanning Tree	
0231	Luxcom	
0233	Sigma Network Systems	
8001-801f	Not Used - reserved	[RFC1661]
8021	Internet Protocol Control Protocol	
8023	OSI Network Layer Control Protocol	
8025	Xerox NS IDP Control Protocol	
8027	DECnet Phase IV Control Protocol	
8029	Appletalk Control Protocol	
802b	Novell IPX Control Protocol	
802d	reserved	
802f	reserved	
8031	Bridging NCP	
8033	Stream Protocol Control Protocol	
8035	Banyan Vines Control Protocol	
8037	reserved till 1993	
8039	reserved	
803b	reserved	
803d	Multi-Link Control Protocol	
803f	NETBIOS Framing Control Protocol	
807d	Not Used - reserved	[RFC1661]
8041	Cisco Systems Control Protocol	
8043	Ascom Timeplex	
8045	Fujitsu LBLB Control Protocol	
8047	DCA Remote Lan Network Control Protocol (RLNCP)	
8049	Serial Data Control Protocol (PPP-SDCP)	
804b	SNA over 802.2 Control Protocol	
804d	SNA Control Protocol	
804f	IP6 Header Compression Control Protocol	
006f	Stampede Bridging Control Protocol	
80cf	Not Used - reserved	[RFC1661]
80fb	compression on single link in multilink group control	
80fd	Compression Control Protocol	
80ff	Not Used - reserved	[RFC1661]
c021	Link Control Protocol	
c023	Password Authentication Protocol	
c025	Link Quality Report	
c027	Shiva Password Authentication Protocol	
c029	CallBack Control Protocol (CBCP)	
c081	Container Control Protocol	[KEN]
c223	Challenge Handshake Authentication Protocol	
c281	Proprietary Authentication Protocol	[KEN]

```
c26f            Stampede Bridging Authorization Protocol
c481            Proprietary Node ID Authentication Protocol [KEN]
```

Protocol field values in the "0xxx" to "3xxx" range identify the network-layer protocol of specific datagrams, and values in the "8xxx" to "bxxx" range identify datagrams belonging to the associated Network Control Protocol (NCP), if any.

It is recommended that values in the "02xx" to "1exx" and "xx01" to "xx1f" ranges not be assigned, as they are compression inefficient.

Protocol field values in the "4xxx" to "7xxx" range are used for protocols with low volume traffic which have no associated NCP.

Protocol field values in the "cxxx" to "exxx" range identify datagrams as Control Protocols (such as LCP).

PPP LCP AND IPCP CODES

The Point-to-Point Protocol (PPP) Link Control Protocol (LCP), [146] the Compression Control Protocol (CCP), Internet Protocol Control Protocol (IPCP), [147] and other control protocols, contain an 8 bit Code field which identifies the type of packet. These Codes are assigned as follows:

Code		Packet Type
1		Configure-Request
2		Configure-Ack
3		Configure-Nak
4		Configure-Reject
5		Terminate-Request
6		Terminate-Ack
7		Code-Reject
8	*	Protocol-Reject
9	*	Echo-Request
10	*	Echo-Reply
11	*	Discard-Request
12	*	Identification
13	*	Time-Remaining
14	+	Reset-Request
15	+	Reset-Reply

* LCP Only
+ CCP Only

PPP LCP CONFIGURATION OPTION TYPES

The Point-to-Point Protocol (PPP) Link Control Protocol (LCP) specifies a number of Configuration Options [146] which are distinguished by an 8 bit Type field. These Types are assigned as follows:

Type	Configuration Option	
1	Maximum-Receive-Unit	
2	Async-Control-Character-Map	
3	Authentication-Protocol	
4	Quality-Protocol	
5	Magic-Number	
6	RESERVED	
7	Protocol-Field-Compression	
8	Address-and-Control-Field-Compression	
9	FCS-Alternatives	
10	Self-Describing-Pad	
11	Numbered-Mode	
12	Multi-Link-Procedure	
13	Callback	
14	Connect-Time	
15	Compound-Frames	
16	Nominal-Data-Encapsulation	
17	Multilink-MRRU	
18	Multilink-Short-Sequence-Number-Header-Format	
19	Multilink-Endpoint-Discriminator	
20	Proprietary	[KEN]
21	DCE-Identifier	[SCHNEIDER]

PPP LCP FCS-ALTERNATIVES

The Point-to-Point Protocol (PPP) Link Control Protocol (LCP) FCS-Alternatives Configuration Option contains an 8-bit Options field which identifies the FCS used. These are assigned as follows:

Bit	FCS
1	Null FCS
2	CCITT 16-Bit FCS
4	CCITT 32-bit FCS

PPP LCP CALLBACK OPERATION FIELDS

The Point-to-Point Protocol (PPP) Link Control Protocol (LCP) Callback Configuration Option contains an 8-bit Operations field which identifies the format of the Message. These are assigned as follows:

Operation	Description
0	Location determined by user authentication.
1	Dialing string.
2	Location identifier.
3	E.164 number.
4	X.500 distinguished name.
5	unassigned
6	Location is determined during CBCP negotiation.

PPP IPCP CONFIGURATION OPTION TYPES

The Point-to-Point Protocol (PPP) Internet Protocol Control Protocol (IPCP) specifies a number of Configuration Options [147] which are distinguished by an 8 bit Type field. These Types are assigned as follows:

Type	Configuration Option
1	IP-Addresses (deprecated)
2	IP-Compression-Protocol
3	IP-Address

PPP ATCP CONFIGURATION OPTION TYPES

The Point-to-Point Protocol (PPP) Apple Talk Control Protocol (ATCP) specifies a number of Configuration Options [RFC-1378] which are distinguished by an 8 bit Type field. These Types are assigned as follows:

Type	Configuration Option
1	AppleTalk-Address
2	Routing-Protocol
3	Suppress-Broadcasts
4	AT-Compression-Protocol
5	Reserved
6	Server-information
7	Zone-information
8	Default-Router-Address

PPP OSINLCP CONFIGURATION OPTION TYPES

The Point-to-Point Protocol (PPP) OSI Network Layer Control Protocol (OSINLCP) specifies a number of Configuration Options [RFC-1377] which are distinguished by an 8 bit Type field. These Types are assigned as follows:

Type	Configuration Option
1	Align-NPDU

PPP BRIDGING CONFIGURATION OPTION TYPES

The Point-to-Point Protocol (PPP) Bridging Control Protocol (BCP) specifies a number of Configuration Options which are distinguished by an 8 bit Type field. These Types are assigned as follows:

Type	Configuration Option
1	Bridge-Identification
2	Line-Identification
3	MAC-Support
4	Tinygram-Compression
5	LAN-Identification
6	MAC-Address
7	Spanning-Tree-Protocol

PPP BRIDGING MAC TYPES

The Point-to-Point Protocol (PPP) Bridging Control Protocol (BCP) contains an 8 bit MAC Type field which identifies the MAC encapsulated. These Types are assigned as follows:

Type	MAC	
0	Reserved	
1	IEEE 802.3/Ethernet	with cannonical addresses
2	IEEE 802.4	with cannonical addresses
3	IEEE 802.5	with non-cannonical addresses
4	FDDI	with non-cannonical addresses
5-10	reserved	
11	IEEE 802.5	with cannonical addresses
12	FDDI	with cannonical addresses

PPP BRIDGING SPANNING TREE

The Point-to-Point Protocol (PPP) Bridging Control Protocol (BCP) Spanning Tree Configuration Option contains an 8-bit Protocol field which identifies the spanning tree used. These are assigned as follows:

Protocol	Spanning Tree
0	Null - no spanning tree protocol supported
1	IEEE 802.1D spanning tree protocol

2	IEEE 802.1G extended spanning tree protocol
3	IBM source route spanning tree protocol
4	DEC LANbridge 100 spanning tree protocol

REFERENCES

[RFC1661] Simpson, W., Editor, "The Point-to-Point Protocol (PPP)", STD 51, RFC 1661, Daydreamer, July 1994.

[RFC1662] Simpson, W., Editor, "PPP in HDLC-like Framing", STD 51, RFC 1662, Daydreamer, July 1994.

PEOPLE

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/ppp-numbers

MACHINE NAMES

These are the Official Machine Names as they appear in the Domain Name System HINFO records and the NIC Host Table. Their use is described in [RFC952].

A machine name or CPU type may be up to 40 characters taken from the set of uppercase letters, digits, and the two punctuation characters hyphen and slash. It must start with a letter, and end with a letter or digit.

AMIGA-500
AMIGA-500/010
AMIGA-500/020
AMIGA-500/EC030
AMIGA-500/030
AMIGA-600
AMIGA-1000
AMIGA-1000/010
AMIGA-1000/020
AMIGA-1000/EC030
AMIGA-1000/030
AMIGA-1200
AMIGA-1200/EC030
AMIGA-1200/030
AMIGA-1200/EC040
AMIGA-1200/LC040
AMIGA-1200/040
AMIGA-2000
AMIGA-2000/010
AMIGA-2000/020
AMIGA-2000/EC030
AMIGA-2000/030
AMIGA-2000/LC040
AMIGA-2000/EC040
AMIGA-2000/040
AMIGA-3000
AMIGA-3000/EC040
AMIGA-3000/LC040
AMIGA-3000/040
AMIGA-3000/060
AMIGA-4000/EC030
AMIGA-4000/030
AMIGA-4000/LC040
AMIGA-4000/040
AMIGA-4000/060
ALTO

ALTOS-6800
AMDAHL-V7
APOLLO
APPLE-MACINTOSH
APPLE-POWERBOOK
ATARI-104ST
ATT-3B1
ATT-3B2
ATT-3B20
ATT-7300
AXP
BBN-C/60
BURROUGHS-B/29
BURROUGHS-B/4800
BUTTERFLY
C/30
C/70
CADLINC
CADR
CDC-170
CDC-170/750
CDC-173
CDTV
CDTV/060
CD32
CELERITY-1200
CLUB-386
COMPAQ-386/20
COMTEN-3690
CP8040
CRAY-1
CRAY-X/MP
CRAY-2
CTIWS-117
DANDELION
DEC-10
DEC-1050
DEC-1077
DEC-1080
DEC-1090
DEC-1090B
DEC-1090T
DEC-2020T
DEC-2040
DEC-2040T
DEC-2050T
DEC-2060
DEC-2060T

DEC-2065
DEC-AXP
DEC-FALCON
DEC-KS10
DECSTATION
DEC-VAX
DEC-VAXCLUSTER
DEC-VAXSTATION
DEC-VAX-11730
DORADO
DPS8/70M
ELXSI-6400
EVEREX-386
FOONLY-F2
FOONLY-F3
FOONLY-F4
GOULD
GOULD-6050
GOULD-6080
GOULD-9050
GOULD-9080
H-316
H-60/68
H-68
H-68/80
H-89
HONEYWELL-DPS-6
HONEYWELL-DPS-8/70
HP3000
HP3000/64
IBM-158
IBM-360/67
IBM-370/3033
IBM-3081
IBM-3084QX
IBM-3101
IBM-4331
IBM-4341
IBM-4361
IBM-4381
IBM-4956
IBM-6152
IBM-PC
IBM-PC/AT
IBM-PC/RT
IBM-PC/XT
IBM-RS/6000
IBM-SERIES/1

IMAGEN
IMAGEN-8/300
IMSAI
INTEGRATED-SOLUTIONS
INTEGRATED-SOLUTIONS-68K
INTEGRATED-SOLUTIONS-CREATOR
INTEGRATED-SOLUTIONS-CREATOR-8
INTEL-386
INTEL-IPSC
IS-1
IS-68010
LMI
LSI-11
LSI-11/2
LSI-11/23
LSI-11/73
M68000
MAC-II
MAC-POWERBOOK
MACINTOSH
MASSCOMP
MC500
MC68000
MICROPORT
MICROVAX
MICROVAX-I
MV/8000
NAS3-5
NCR-COMTEN-3690
NEXT/N1000-316
NOW
ONYX-Z8000
PDP-11
PDP-11/3
PDP-11/23
PDP-11/24
PDP-11/34
PDP-11/40
PDP-11/44
PDP-11/45
PDP-11/50
PDP-11/70
PDP-11/73
PE-7/32
PE-3205
PERQ
PLEXUS-P/60
PLI

PLURIBUS
PRIME-2350
PRIME-2450
PRIME-2755
PRIME-9655
PRIME-9755
PRIME-9955II
PRIME-2250
PRIME-2655
PRIME-9955
PRIME-9950
PRIME-9650
PRIME-9750
PRIME-2250
PRIME-750
PRIME-850
PRIME-550II
PYRAMID-90
PYRAMID-90MX
PYRAMID-90X
RIDGE
RIDGE-32
RIDGE-32C
ROLM-1666
RS/6000
S1-MKIIA
SMI
SEQUENT-BALANCE-8000
SIEMENS
SILICON-GRAPHICS
SILICON-GRAPHICS-IRIS
SGI-IRIS-2400
SGI-IRIS-2500
SGI-IRIS-3010
SGI-IRIS-3020
SGI-IRIS-3030
SGI-IRIS-3110
SGI-IRIS-3115
SGI-IRIS-3120
SGI-IRIS-3130
SGI-IRIS-4D/20
SGI-IRIS-4D/20G
SGI-IRIS-4D/25
SGI-IRIS-4D/25G
SGI-IRIS-4D/25S
SGI-IRIS-4D/50
SGI-IRIS-4D/50G
SGI-IRIS-4D/50GT

SGI-IRIS-4D/60
SGI-IRIS-4D/60G
SGI-IRIS-4D/60T
SGI-IRIS-4D/60GT
SGI-IRIS-4D/70
SGI-IRIS-4D/70G
SGI-IRIS-4D/70GT
SGI-IRIS-4D/80GT
SGI-IRIS-4D/80S
SGI-IRIS-4D/120GTX
SGI-IRIS-4D/120S
SGI-IRIS-4D/210GTX
SGI-IRIS-4D/210S
SGI-IRIS-4D/220GTX
SGI-IRIS-4D/220S
SGI-IRIS-4D/240GTX
SGI-IRIS-4D/240S
SGI-IRIS-4D/280GTX
SGI-IRIS-4D/280S
SGI-IRIS-CS/12
SGI-IRIS-4SERVER-8
SPERRY-DCP/10
SUN
SUN-2
SUN-2/50
SUN-2/100
SUN-2/120
SUN-2/130
SUN-2/140
SUN-2/150
SUN-2/160
SUN-2/170
SUN-3/50
SUN-3/60
SUN-3/75
SUN-3/80
SUN-3/110
SUN-3/140
SUN-3/150
SUN-3/160
SUN-3/180
SUN-3/200
SUN-3/260
SUN-3/280
SUN-3/470
SUN-3/480
SUN-4/60
SUN-4/110

SUN-4/150
SUN-4/200
SUN-4/260
SUN-4/280
SUN-4/330
SUN-4/370
SUN-4/390
SUN-50
SUN-100
SUN-120
SUN-130
SUN-150
SUN-170
SUN-386i/250
SUN-68000
SYMBOLICS-3600
SYMBOLICS-3670
SYMMETRIC-375
SYMULT
TANDEM-TXP
TANDY-6000
TEK-6130
TI-EXPLORER
TP-4000
TRS-80
UNIVAC-1100
UNIVAC-1100/60
UNIVAC-1100/62
UNIVAC-1100/63
UNIVAC-1100/64
UNIVAC-1100/70
UNIVAC-1160
UNKNOWN
VAX
VAX-11/725
VAX-11/730
VAX-11/750
VAX-11/780
VAX-11/785
VAX-11/790
VAX-11/8600
VAX-8600
VAXCLUSTER
VAXSTATION
WANG-PC002
WANG-VS100
WANG-VS400
WYSE-386

WYSE-WN5004
WYSE-WN5008
WYSE-WN5104
WYSE-WN5108
WYSE-WX15C
WYSE-WX17C
WYSE-WX17M
WYSE-WX19C
WYSE-WX19M
WYSE-WYX14M
WYSE-WYX5
XEROX-1108
XEROX-8010
ZENITH-148

REFERENCES

[RFC952] Harrenstien, K., Stahl, M., and E. Feinler, "DoD Internet Host Table Specification", RFC 952, SRI, October 1985.

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OPERATING SYSTEM NAMES

These are the Official System Names as they appear in the Domain Name System HINFO records and the NIC Host Table. Their use is described in [RFC952].

A system name may be up to 40 characters taken from the set of uppercase letters, digits, and the three punctuation characters hyphen, period, and slash. It must start with a letter, and end with a letter or digit.

AEGIS
AMIGA-OS-1.2
AMIGA-OS-1.3
AMIGA-OS-2.0
AMIGA-OS-2.1
AMIGA-OS-3.0
AMIGA-OS-3.1
APOLLO
AIX/370
AIX-PS/2
BS-2000
CEDAR
CGW
CHORUS
CHRYSALIS
CMOS
CMS
COS
CPIX
CTOS
CTSS
DCN
DDNOS
DOMAIN
DOS
EDX
ELF
EMBOS
EMMOS
EPOS
FOONEX
FORTH
FUZZ
GCOS
GPOS

HDOS
IMAGEN
INTERCOM
IMPRESS
INTERLISP
IOS
IRIX
ISI-68020
ITS
LISP
LISPM
LOCUS
MACOS
MINOS
MOS
MPE5
MPE/V
MPE/IX
MSDOS
MULTICS
MUSIC
MUSIC/SP
MVS
MVS/SP
NEXUS
NMS
NONSTOP
NOS-2
NTOS
OPENVMS
OS/DDP
OS/2
OS4
OS86
OSX
PCDOS
PERQ/OS
PLI
PSDOS/MIT
PRIMOS
RMX/RDOS
ROS
RSX11M
RTE-A
SATOPS
SCO-OPEN-DESKTOP-1.0
SCO-OPEN-DESKTOP-1.1
SCO-OPEN-DESKTOP-2.0

SCO-OPEN-DESKTOP-3.0
SCO-OPEN-DESKTOP-LITE-3.0
SCO-OPEN-SERVER-3.0
SCO-UNIX-3.2.0
SCO-UNIX-3.2V2.0
SCO-UNIX-3.2V2.1
SCO-UNIX-3.2V4.0
SCO-UNIX-3.2V4.1
SCO-UNIX-3.2V4.2
SCO-XENIX-386-2.3.2
SCO-XENIX-386-2.3.3
SCO-XENIX-386-2.3.4
SCS
SIMP
SUN
SUN-OS-3.5
SUN-OS-4.0
SWIFT
TAC
TANDEM
TENEX
THE-MAJOR-BBS
TOPS10
TOPS20
TOS
TP3010
TRSDOS
ULTRIX
UNIX
UNIX-BSD
UNIX-V1AT
UNIX-V
UNIX-V.1
UNIX-V.2
UNIX-V.3
UNIX-PC
UNKNOWN
UT2D
V
VM
VM/370
VM/CMS
VM/SP
VMS
VMS/EUNICE
VRTX
WAITS
WANG

WIN32
WYSE-WYXWARE
X11R3
XDE
XENIX

REFERENCES

[RFC952] Harrenstien, K., Stahl, M., and E. Feinler, "DoD Internet Host Table Specification", RFC 952, SRI, October 1985.

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/operating-system-names

TERMINAL TYPE NAMES

These are the Official Terminal Type Names. Their use is described in [RFC930]. The maximum length of a name is 40 characters.

A terminal names may be up to 40 characters taken from the set of uppercase letters, digits, and the two punctuation characters hyphen and slash. It must start with a letter, and end with a letter or digit.

ADDS-CONSUL-980
ADDS-REGENT-100
ADDS-REGENT-20
ADDS-REGENT-200
ADDS-REGENT-25
ADDS-REGENT-40
ADDS-REGENT-60
ADDS-VIEWPOINT
ADDS-VIEWPOINT-60
AED-512
AMPEX-DIALOGUE-210
AMPEX-DIALOGUE-80
AMPEX-210
AMPEX-230
ANDERSON-JACOBSON-510
ANDERSON-JACOBSON-630
ANDERSON-JACOBSON-832
ANDERSON-JACOBSON-841
ANN-ARBOR-AMBASSADOR
ANSI
ARDS
BITGRAPH
BUSSIPLEXER
CALCOMP-565
CDC-456
CDI-1030
CDI-1203
C-ITOH-101
C-ITOH-50
C-ITOH-80
CLNZ
COMPUCOLOR-II
CONCEPT-100
CONCEPT-104
CONCEPT-108
DATA-100

DATA-GENERAL-6053
DATAGRAPHIX-132A
DATAMEDIA-1520
DATAMEDIA-1521
DATAMEDIA-2500
DATAMEDIA-3025
DATAMEDIA-3025A
DATAMEDIA-3045
DATAMEDIA-3045A
DATAMEDIA-DT80/1
DATAPOINT-2200
DATAPOINT-3000
DATAPOINT-3300
DATAPOINT-3360
DEC-DECWRITER-I
DEC-DECWRITER-II
DEC-GIGI
DEC-GT40
DEC-GT40A
DEC-GT42
DEC-LA120
DEC-LA30
DEC-LA36
DEC-LA38
DEC-VT05
DEC-VT100
DEC-VT101
DEC-VT102
DEC-VT125
DEC-VT131
DEC-VT132
DEC-VT200
DEC-VT220
DEC-VT240
DEC-VT241
DEC-VT300
DEC-VT320
DEC-VT340
DEC-VT50
DEC-VT50H
DEC-VT52
DEC-VT55
DEC-VT61
DEC-VT62
DELTA-DATA-5000
DELTA-DATA-NIH-7000
DELTA-TELTERM-2
DIABLO-1620

DIABLO-1640
DIGILOG-333
DTC-300S
DTC-382
EDT-1200
ETOS52-APL
ETOS52-CRT
ETOS52-FDW
ETOS52-FUP
ETOS52-GFM
ETOS52-SPR
EXECUPORT-4000
EXECUPORT-4080
FACIT-TWIST-4440
FREEDOM-100
FREEDOM-110
FREEDOM-200
GENERAL-TERMINAL-100A
GENERAL-TERMINAL-101
GIPSI-TX-M
GIPSI-TX-ME
GIPSI-TX-C4
GIPSI-TX-C8
GSI
HAZELTINE-1420
HAZELTINE-1500
HAZELTINE-1510
HAZELTINE-1520
HAZELTINE-1552
HAZELTINE-2000
HAZELTINE-ESPRIT
HITACHI-5601
HITACHI-5603
HITACHI-5603E
HITACHI-5603EA
HITACHI-560X
HITACHI-560XE
HITACHI-560XEA
HITACHI-560PR
HITACHI-HOAP1
HITACHI-HOAP2
HITACHI-HOAP3
HITACHI-HOAP4
HP-2392
HP-2621
HP-2621A
HP-2621P
HP-2623

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HP-2626
HP-2626A
HP-2626P
HP-2627
HP-2640
HP-2640A
HP-2640B
HP-2645
HP-2645A
HP-2648
HP-2648A
HP-2649
HP-2649A
IBM-1050
IBM-2741
IBM-3101
IBM-3101-10
IBM-3151
IBM-3179-2
IBM-3180-2
IBM-3196-A1
IBM-3275-2
IBM-3276-2
IBM-3276-3
IBM-3276-4
IBM-3277-2
IBM-3278-2
IBM-3278-3
IBM-3278-4
IBM-3278-5
IBM-3279-2
IBM-3279-3
IBM-3477-FC
IBM-3477-FG
IBM-5081
IBM-5151
IBM-5154
IBM-5251-11
IBM-5291-1
IBM-5292-2
IBM-5555-B01
IBM-5555-C01
IBM-6153
IBM-6154
IBM-6155
IBM-AED
IBM-3278-2-E
IBM-3278-3-E
```

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IBM-3278-4-E
IBM-3278-5-E
IBM-3279-2-E
IBM-3279-3-E
IMLAC
INFOTON-100
INFOTON-400
INFOTONKAS
ISC-8001
LSI-ADM-1
LSI-ADM-11
LSI-ADM-12
LSI-ADM-2
LSI-ADM-20
LSI-ADM-22
LSI-ADM-220
LSI-ADM-3
LSI-ADM-31
LSI-ADM-3A
LSI-ADM-42
LSI-ADM-5
MEMOREX-1240
MICROBEE
MICROTERM-ACT-IV
MICROTERM-ACT-V
MICROTERM-ERGO-301
MICROTERM-MIME-1
MICROTERM-MIME-2
MICROTERM-ACT-5A
MICROTERM-TWIST
NEC-5520
NETRONICS
NETWORK-VIRTUAL-TERMINAL
OMRON-8025AG
PERKIN-ELMER-550
PERKIN-ELMER-1100
PERKIN-ELMER-1200
PERQ
PLASMA-PANEL
QUME-SPRINT-5
QUME-101
QUME-102
SOROC
SOROC-120
SOUTHWEST-TECHNICAL-PRODUCTS-CT82
SUN
SUPERBEE
SUPERBEE-III-M
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TEC
TEKTRONIX-4006
TEKTRONIX-4010
TEKTRONIX-4012
TEKTRONIX-4013
TEKTRONIX-4014
TEKTRONIX-4023
TEKTRONIX-4024
TEKTRONIX-4025
TEKTRONIX-4027
TEKTRONIX-4105
TEKTRONIX-4107
TEKTRONIX-4110
TEKTRONIX-4112
TEKTRONIX-4113
TEKTRONIX-4114
TEKTRONIX-4115
TEKTRONIX-4125
TEKTRONIX-4404
TELERAY-1061
TELERAY-3700
TELERAY-3800
TELETEC-DATASCREEN
TELETERM-1030
TELETYPE-33
TELETYPE-35
TELETYPE-37
TELETYPE-38
TELETYPE-40
TELETYPE-43
TELEVIDEO-910
TELEVIDEO-912
TELEVIDEO-920
TELEVIDEO-920B
TELEVIDEO-920C
TELEVIDEO-925
TELEVIDEO-955
TELEVIDEO-950
TELEVIDEO-970
TELEVIDEO-975
TERMINET-1200
TERMINET-300
TI-700
TI-733
TI-735
TI-743
TI-745
TI-800

TYCOM
UNIVAC-DCT-500
VIDEO-SYSTEMS-1200
VIDEO-SYSTEMS-5000
VOLKER-CRAIG-303
VOLKER-CRAIG-303A
VOLKER-CRAIG-404
VISUAL-200
VISUAL-55
WYSE-30
WYSE-50
WYSE-60
WYSE-75
WYSE-85
WYSE-99GT
WYSE-100
WYSE-120
WYSE-120ES
WYSE-150
WYSE-150ES
WYSE-160
WYSE-160ES
WYSE-185
WYSE-185ES
WYSE-285
WYSE-285ES
WYSE-325
WYSE-325ES
WYSE-350
WYSE-370
XEROX-1720
XTERM
ZENITH-H19
ZENITH-Z29
ZENTEC-30

REFERENCES

[RFC930] Solomon, M., and E. Wimmers, "Telnet Terminal Type Option", RFC 930, University of Wisconsin, Madison, January 1985.

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URL = ftp://ftp.isi.edu/in-notes/iana/assignments/terminal-type-names

PROTOCOL AND SERVICE NAMES

These are the Official Protocol Names as they appear in the Domain Name System WKS records and the NIC Host Table. Their use is described in [RFC952].

A protocol or service may be up to 40 characters taken from the set of uppercase letters, digits, and the punctuation character hyphen. It must start with a letter, and end with a letter or digit.

```
ARGUS               - ARGUS Protocol
ARP                 - Address Resolution Protocol
AUTH                - Authentication Service
BBN-RCC-MON         - BBN RCC Monitoring
BL-IDM              - Britton Lee Intelligent Database Machine
BOOTP               - Bootstrap Protocol
BOOTPC              - Bootstrap Protocol Client
BOOTPS              - Bootstrap Protocol Server
BR-SAT-MON          - Backroom SATNET Monitoring
CFTP                - CFTP
CHAOS               - CHAOS Protocol
CHARGEN             - Character Generator Protocol
CISCO-FNA           - CISCO FNATIVE
CISCO-TNA           - CISCO TNATIVE
CISCO-SYS           - CISCO SYSMAINT
CLOCK               - DCNET Time Server Protocol
CMOT                - Common Mgmnt Info Ser and Prot over TCP/IP
COOKIE-JAR          - Authentication Scheme
CSNET-NS            - CSNET Mailbox Nameserver Protocol
DAYTIME             - Daytime Protocol
DCN-MEAS            - DCN Measurement Subsystems Protocol
DCP                 - Device Control Protocol
DGP                 - Dissimilar Gateway Protocol
DISCARD             - Discard Protocol
DMF-MAIL            - Digest Message Format for Mail
DOMAIN              - Domain Name System
ECHO                - Echo Protocol
EGP                 - Exterior Gateway Protocol
EHF-MAIL            - Encoding Header Field for Mail
EMCON               - Emission Control Protocol
EMFIS-CNTL          - EMFIS Control Service
EMFIS-DATA          - EMFIS Data Service
FCONFIG             - Fujitsu Config Protocol
FINGER              - Finger Protocol
FTP                 - File Transfer Protocol
FTP-DATA            - File Transfer Protocol Data
```

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GGP                - Gateway Gateway Protocol
GRAPHICS           - Graphics Protocol
HMP                - Host Monitoring Protocol
HOST2-NS           - Host2 Name Server
HOSTNAME           - Hostname Protocol
ICMP               - Internet Control Message Protocol
IGMP               - Internet Group Management Protocol
IGP                - Interior Gateway Protocol
IMAP2              - Interim Mail Access Protocol version 2
INGRES-NET         - INGRES-NET Service
IP                 - Internet Protocol
IPCU               - Internet Packet Core Utility
IPPC               - Internet Pluribus Packet Core
IP-ARC             - Internet Protocol on ARCNET
IP-ARPA            - Internet Protocol on ARPANET
IP-CMPRS           - Compressing TCP/IP Headers
IP-DC              - Internet Protocol on DC Networks
IP-DVMRP           - Distance Vector Multicast Routing Protocol
IP-E               - Internet Protocol on Ethernet Networks
IP-EE              - Internet Protocol on Exp. Ethernet Nets
IP-FDDI            - Transmission of IP over FDDI
IP-HC              - Internet Protocol on Hyperchannnel
IP-IEEE            - Internet Protocol on IEEE 802
IP-IPX             - Transmission of 802.2 over IPX Networks
IP-MTU             - IP MTU Discovery Options
IP-NETBIOS         - Internet Protocol over NetBIOS Networks
IP-SLIP            - Transmission of IP over Serial Lines
IP-WB              - Internet Protocol on Wideband Network
IP-X25             - Internet Protocol on X.25 Networks
IRTP               - Internet Reliable Transaction Protocol
ISI-GL             - ISI Graphics Language Protocol
ISO-TP4            - ISO Transport Protocol Class 4
ISO-TSAP           - ISO TSAP
LA-MAINT           - IMP Logical Address Maintenance
LARP               - Locus Address Resoultion Protocol
LDP                - Loader Debugger Protocol
LEAF-1             - Leaf-1 Protocol
LEAF-2             - Leaf-2 Protocol
LINK               - Link Protocol
LOC-SRV            - Location Service
LOGIN              - Login Host Protocol
MAIL               - Format of Electronic Mail Messages
MERIT-INP          - MERIT Internodal Protocol
METAGRAM           - Metagram Relay
MIB                - Management Information Base
MIT-ML-DEV         - MIT ML Device
MFE-NSP            - MFE Network Services Protocol
MIT-SUBNET         - MIT Subnet Support
```

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MIT-DOV             - MIT Dover Spooler
MPM                 - Internet Message Protocol (Multimedia Mail)
MPM-FLAGS           - MPM Flags Protocol
MPM-SND             - MPM Send Protocol
MSG-AUTH            - MSG Authentication Protocol
MSG-ICP             - MSG ICP Protocol
MUX                 - Multiplexing Protocol
NAMESERVER          - Host Name Server
NETBIOS-DGM         - NETBIOS Datagram Service
NETBIOS-NS          - NETBIOS Name Service
NETBIOS-SSN         - NETBIOS Session Service
NETBLT              - Bulk Data Transfer Protocol
NETED               - Network Standard Text Editor
NETRJS              - Remote Job Service
NI-FTP              - NI File Transfer Protocol
NI-MAIL             - NI Mail Protocol
NICNAME             - Who Is Protocol
NFILE               - A File Access Protocol
NNTP                - Network News Transfer Protocol
NSW-FE              - NSW User System Front End
NTP                 - Network Time Protocol
NVP-II              - Network Voice Protocol
OSPF                - Open Shortest Path First Interior GW Protocol
PCMAIL              - Pcmail Transport Protocol
POP2                - Post Office Protocol - Version 2
POP3                - Post Office Protocol - Version 3
PPP                 - Point-to-Point Protocol
PRM                 - Packet Radio Measurement
PUP                 - PUP Protocol
PWDGEN              - Password Generator Protocol
QUOTE               - Quote of the Day Protocol
RARP                - A Reverse Address Resolution Protocol
RATP                - Reliable Asynchronous Transfer Protocol
RE-MAIL-CK          - Remote Mail Checking Protocol
RDP                 - Reliable Data Protocol
RIP                 - Routing Information Protocol
RJE                 - Remote Job Entry
RLP                 - Resource Location Protocol
RTELNET             - Remote Telnet Service
RVD                 - Remote Virtual Disk Protocol
SAT-EXPAK           - Satnet and Backroom EXPAK
SAT-MON             - SATNET Monitoring
SEP                 - Sequential Exchange Protocol
SFTP                - Simple File Transfer Protocol
SGMP                - Simple Gateway Monitoring Protocol
SNMP                - Simple Network Management Protocol
SMI                 - Structure of Management Information
SMTP                - Simple Mail Transfer Protocol
```

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SQLSRV              - SQL Service
ST                  - Stream Protocol
STATSRV             - Statistics Service
SU-MIT-TG           - SU/MIT Telnet Gateway Protocol
SUN-RPC             - SUN Remote Procedure Call
SUPDUP              - SUPDUP Protocol
SUR-MEAS            - Survey Measurement
SWIFT-RVF           - Remote Virtual File Protocol
TACACS-DS           - TACACS-Database Service
TACNEWS             - TAC News
TCP                 - Transmission Control Protocol
TCP-ACO             - TCP Alternate Checksum Option
TELNET              - Telnet Protocol
TFTP                - Trivial File Transfer Protocol
THINWIRE            - Thinwire Protocol
TIME                - Time Server Protocol
TP-TCP              - ISO Transport Service on top of the TCP
TRUNK-1             - Trunk-1 Protocol
TRUNK-2             - Trunk-2 Protocol
UCL                 - University College London Protocol
UDP                 - User Datagram Protocol
NNTP                - Network News Transfer Protocol
USERS               - Active Users Protocol
UUCP-PATH           - UUCP Path Service
VIA-FTP             - VIA Systems-File Transfer Protocol
VISA                - VISA Protocol
VMTP                - Versatile Message Transaction Protocol
WB-EXPAK            - Wideband EXPAK
WB-MON              - Wideband Monitoring
XNET                - Cross Net Debugger
XNS-IDP             - Xerox NS IDP
```

REFERENCES

[RFC952] Harrenstien, K., Stahl, M., and E. Feinler, "DoD Internet Host Table Specification", RFC 952, SRI, October 1985.

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Security Considerations

Security issues are not discussed in this memo.

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