

Network Working Group
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Obsoletes RFCs: 1340, 1060, 1010, 990, 960,
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762, 758, 755, 750, 739, 604, 503, 433, 349
Obsoletes IENs: 127, 117, 93
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ISI
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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 concatenating these files together with a minimum of formatting "glue". The authors apologize 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).

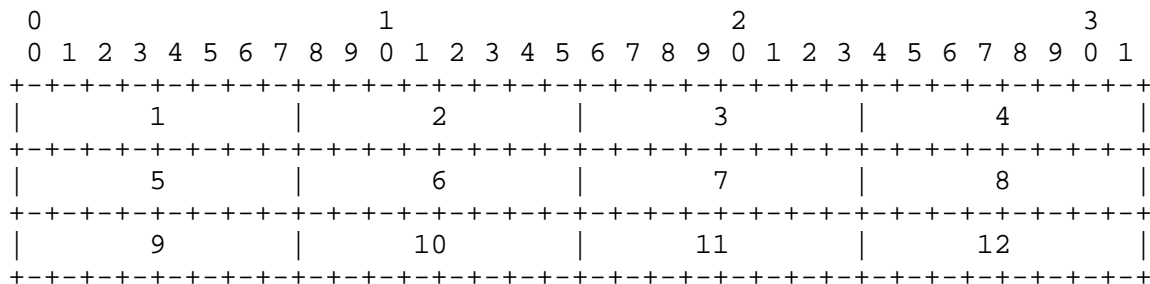
If you are developing a protocol or application that will require the use of a link, socket, port, protocol, etc., please contact the IANA to receive a number assignment.

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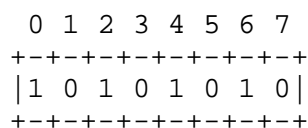
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Phone: +1 310-822-1511

Data Notations

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.



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).



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:

$$\text{IP-address} ::= \{ \langle \text{Network-number} \rangle, \langle \text{Host-number} \rangle \}$$

or

$$\text{IP-address} ::= \{ \text{<Network-number>, <Subnet-number>, <Host-number> } \}$$

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) $\{0, \text{<Host-number>}\}$

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.

REFERENCES

- [COHEN] Cohen, D., "On Holy Wars and a Plea for Peace", IEEE Computer Magazine, October 1981.
- [CIDR1] Fuller, V., T. Li, J. Yu, and K. Varadhan, "Classless Inter-Domain Routing (CIDR): an Address Assignment and Aggregation Strategy", RFC 1519, September 1993.
- [CIDR2] Rekhter, Y., and T. Li, "An Architecture for IP Address Allocation with CIDR", RFC 1518, September 1993.

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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]

REFERENCES

- [RFC791] Postel, J., ed., "Internet Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 791, USC/Information Sciences Institute, September 1981.
- [RFC1190] Topolcic, C., Editor, "Experimental Internet Stream Protocol, Version 2 (ST-II)", RFC 1190, CIP Working Group, October 1990.

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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 (encapsulation)	[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]

REFERENCES

- [CFTP] Forsdick, H., "CFTP", Network Message, Bolt Beranek and Newman, January 1982.
- [CISCO] Cisco Systems, "Gateway Server Reference Manual", Manual Revision B, January 10, 1988.
- [DDN] Feinler, E., Editor, "DDN Protocol Handbook", Network Information Center, SRI International, December 1985.
- [DGP] M/A-COM Government Systems, "Dissimilar Gateway Protocol Specification, Draft Version", Contract no. CS901145, November 16, 1987.
- [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.
- [IEN90] Cohen, D. and J. Postel, "Multiplexing Protocol", IEN 90, USC/Information Sciences Institute, May 1979.
- [IEN119] Forgie, J., "ST - A Proposed Internet Stream Protocol", IEN 119, MIT Lincoln Laboratory, September 1979.

- [IEN158] Haverty, J., "XNET Formats for Internet Protocol Version 4", IEN 158, October 1980.
- [MFENET] Shuttleworth, B., "A Documentary of MFENet, a National Computer Network", UCRL-52317, Lawrence Livermore Labs, Livermore, California, June 1977.
- [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.
- [SPRITE] Welch, B., "The Sprite Remote Procedure Call System", Technical Report, UCB/Computer Science Dept., 86/302, University of California at Berkeley, June 1986.
- [RFC741] Cohen, D., "Specifications for the Network Voice Protocol", RFC 741, ISI/RR 7539, USC/Information Sciences Institute, March 1976.
- [RFC768] Postel, J., "User Datagram Protocol", STD 6, RFC 768, USC/Information Sciences Institute, August 1980.
- [RFC791] Postel, J., "Internet Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 791, DARPA, September 1981.
- [RFC792] Postel, J., "Internet Control Message Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 792, USC/Information Sciences Institute, September 1981.
- [RFC793] Postel, J., "Transmission Control Protocol - DARPA Internet Program Protocol Specification", STD 7, RFC 793, USC/Information Sciences Institute, September 1981.
- [RFC823] Hinden, R., and A. Sheltzer, "The DARPA Internet Gateway", RFC 823, BBN, September 1982.
- [RFC869] Hinden, R., "A Host Monitoring Protocol", RFC 869, Bolt Beranek and Newman, December 1983.
- [RFC888] Seamonson, L., and E. Rosen, "STUB" Exterior Gateway Protocol", RFC 888, BBN Communications Corporation, January 1984.
- [RFC905] International Standards Organization, "ISO Transport Protocol Specification - ISO DP 8073", RFC 905, April 1984.

- [RFC908] Velten, D., R. Hinden, and J. Sax, "Reliable Data Protocol", RFC 908, BBN Communications Corporation, July 1984.
- [RFC938] Miller, T., "Internet Reliable Transaction Protocol", RFC 938, ACC, February 1985.
- [RFC969] Clark, D., M. Lambert, and L. Zhang, "NETBLT: A Bulk Data Transfer Protocol", RFC 969, MIT Laboratory for Computer Science, December 1985.
- [RFC1112] Deering, S., "Host Extensions for IP Multicasting", STD 5, RFC 1112, Stanford University, August 1989.
- [RFC1190] Topolcic, C., Editor, "Experimental Internet Stream Protocol, Version 2 (ST-II)", RFC 1190, CIP Working Group, October 1990.
- [RFC1241] Woodburn, W., and D. Mills, "A Scheme for an Internet Encapsulation Protocol: Version 1", RFC 1241, SAIC, University of Delaware, July 1991.
- [RFC1583] Moy, J., "The OSPF Specification", RFC 1583, Proteon, March 1994.

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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--- ></td
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
nickname	43/tcp	Who Is
nickname	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
#		<mailrus!uflorida!rml!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>
cfdpkt	120/tcp	CFDPKT
cfdpkt	120/udp	CFDPKT
#		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 Buffum <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.OUU.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>
uarp	219/tcp	Unisys ARPs
uarp	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
faterv	347/tcp	Fatmen Server
faterv	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 <lelang@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.bsl.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@hpptcl6.rose.hp.com>
arns	384/tcp	A Remote Network Server System
arns	384/udp	A Remote Network Server System
#		David Hornsby <djh@munniari.OZ.AU>
ibm-app	385/tcp	IBM Application
ibm-app	385/udp	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	
rx	761/tcp	
rx	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 convenience 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@hpfcfn.fc.hp.com>
socks	1080/tcp	Socks
socks	1080/udp	Socks
#		Ying-Da Lee <yilee@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-mmcc	1347/tcp	multi media conferencing
bbn-mmcc	1347/udp	multi media conferencing
bbn-mmxx	1348/tcp	multi media conferencing
bbn-mmxx	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	CONNLCI
connlcli	1358/udp	CONNLCI
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.Schroeder@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.jp>
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 Barthelémy <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 <sphipp@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--- ></td
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/udp	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>
mload	1427/tcp	mload monitoring tool
mload	1427/udp	mload 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 <ublaub!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--- ></td
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/udp	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 <rws kubow@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	

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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	
dlsrcpn	2065/tcp	Data Link Switch Read Port Number
dlsrcpn	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
rtscclient	2501/tcp	Resource Tracking system client
rtscclient	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
complex-main	5000/tcp	
complex-main	5000/udp	
complex-link	5001/tcp	
complex-link	5001/udp	
rfe	5002/tcp	radio free ethernet
rfe	5002/udp	radio free ethernet
telepathstart	5010/tcp	TelepathStart
telepathstart	5010/udp	TelepathStart
telepathattack	5011/tcp	TelepathAttack
telepathattack	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

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[Tim Clark]

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

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

[KS14] <mystery contact>

[Andrew Maffei]

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[Guido van Rossum]

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[]

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 than 1024 if the process is privileged, or greater than 1024 if the process is not privileged. 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 unnecessary.

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 referred 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 - Experimental 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.

REFERENCES

- [RFC791] Postel, J., "Internet Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 791, DARPA, September 1981.
- [RFC1108] Kent, S., "U.S. Department of Defense Security Options for the Internet Protocol", RFC 1108, BBN Communications, November 1991.
- [RFC1191] Mogul, J., and S. Deering, "Path MTU Discovery", RFC 1191, DECWRL, Stanford University, November 1990.
- [RFC1349] Almquist, P., "Type of Service in the Internet Protocol Suite", RFC 1349, Consultant, July 1992.

[RFC1358] Chapin, L., Chair, "Charter of the Internet Architecture Board (IAB)", RFC 1358, Internet Architecture Board, August 1992.

[RFC1393] Malkin, G., "Traceroute Using an IP Option", RFC 1393, Xylogics, Inc., January 1993.

[RFC1455] Eastlake, D., "Physical Link Security Type of Service", RFC 1455, Digital Equipment Corporation, May 1993.

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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]

REFERENCES

- [RFC792] Postel, J., "Internet Control Message Protocol", STD 5, RFC 792, USC/Information Sciences Institute, September 1981.
- [RFC950] Mogul, J., and J. Postel, "Internet Standard Subnetting Procedure", STD 5, RFC 950, Stanford, USC/Information Sciences Institute, August 1985.
- [RFC1108] Kent, S., "U.S. Department of Defense Security Options for the Internet Protocol", RFC 1108, November 1991.
- [RFC1256] Deering, S., Editor, "ICMP Router Discovery Messages", RFC 1256, Xerox PARC, September 1991.
- [RFC1393] Malkin, G., "Traceroute Using an IP Option", RFC 1393, Xylogics, Inc., January 1993.
- [RFC1475] Ullmann, R., "TP/IX: The Next Internet", RFC 1475, Process Software Corporation, June 1993.

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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]

REFERENCES

[KAY] Kay, J. and Pasquale, J., "Measurement, Analysis, and Improvement of UDP/IP Throughput for the DECstation 5000," Proceedings of the Winter 1993 Usenix Conference, January 1993 (available for anonymous FTP in

ucsd.edu:/pub/csl/fastnet/fastnet.tar.Z). <jkay@ucsd.edu>

[RFC793] Postel, J., "Transmission Control Protocol - DARPA Internet Program Protocol Specification", STD 7, RFC 793, DARPA, September 1981.

[RFC1323] Jacobson, V., Braden, R., and D. Borman, "TCP Extensions for High Performance", RFC 1323, LBL, ISI, Cray Research, May 1992.

[RFC1072] Jacobson, V., and R. Braden, "TCP Extensions for Long-Delay Paths", RFC 1072, LBL, ISI, October 1988.

[RFC1693] ?????

[RFC1146] Zweig, J., and C. Partridge, "TCP Alternate Checksum Options", RFC 1146, UIUC, BBN, March 1990.

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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 registered 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]

REFERENCES

- [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.
- [NIC50005] DDN Protocol Handbook, "Telnet Reconnection Option", "Telnet Output Line Width Option", "Telnet Output Page Size Option", NIC 50005, December 1985.
- [RFC652] Crocker, D., "Telnet Output Carriage-Return Disposition Option", RFC 652, UCLA-NMC, October 1974.
- [RFC653] Crocker, D., "Telnet Output Horizontal Tabstops Option", RFC 653, UCLA-NMC, October 1974.
- [RFC654] Crocker, D., "Telnet Output Horizontal Tab Disposition Option", RFC 654, UCLA-NMC, October 1974.
- [RFC655] Crocker, D., "Telnet Output Formfeed Disposition Option", RFC 655, UCLA-NMC, October 1974.

- [RFC656] Crocker, D., "Telnet Output Vertical Tabstops Option", RFC 656, UCLA-NMC, October 1974.
- [RFC657] Crocker, D., "Telnet Output Vertical Tab Disposition Option", RFC 657, UCLA-NMC, October 1974.
- [RFC658] Crocker, D., "Telnet Output Linefeed Disposition", RFC 658, UCLA-NMC, October 1974.
- [RFC698] Tovar, "Telnet Extended ASCII Option", RFC 698, Stanford University-AI, July 1975.
- [RFC726] Postel, J. and D. Crocker, "Remote Controlled Transmission and Echoing Telnet Option", RFC 726, SRI-ARC, UC Irvine, March 1977.
- [RFC727] Crispin, M., "Telnet Logout Option", RFC 727, Stanford University-AI, April 1977.
- [RFC734] Crispin, M., "SUPDUP Protocol", RFC 734, Stanford, October 1977.
- [RFC735] Crocker, D. and R. Gumpertz, "Revised Telnet Byte Marco Option", RFC 735, Rand, CMU, November 1977.
- [RFC736] Crispin, M., "Telnet SUPDUP Option", Stanford University-AI, RFC 736, Stanford, October 1977.
- [RFC749] Greenberg, B., "Telnet SUPDUP-OUTPUT Option", RFC 749, MIT-Multics, September 1978.
- [RFC779] Killian, E., "Telnet Send-Location Option", RFC 779, LLL, April 1981.
- [RFC856] Postel, J. and J. Reynolds, "Telnet Binary Transmission", STD 27, RFC 856, USC/Information Sciences Institute, May 1983.
- [RFC857] Postel, J. and J. Reynolds, "Telnet Echo Option", STD 28, RFC 857, USC/Information Sciences Institute, May 1983.
- [RFC858] Postel, J. and J. Reynolds, "Telnet Suppress Go Ahead Option", STD 29, RFC 858, USC/Information Sciences Institute, May 1983.
- [RFC859] Postel, J. and J. Reynolds, "Telnet Status Option", STD 30, RFC 859, USC/Information Sciences Institute, May 1983.

- [RFC860] Postel, J. and J. Reynolds, "Telnet Timing Mark Option", STD 31, RFC 860, USC/Information Sciences Institute, May 1983.
- [RFC861] Postel, J. and J. Reynolds, "Telnet Extended Options - List Option", STD 32, RFC 861, USC/Information Sciences Institute, May 1983.
- [RFC885] Postel, J., "Telnet End of Record Option", RFC 885, USC/Information Sciences Institute, December 1983.
- [RFC927] Anderson, B., "TACACS User Identification Telnet Option", RFC 927, BBN, December 1984.
- [RFC933] Silverman, S., "Output Marking Telnet Option", RFC 933, MITRE, January 1985.
- [RFC946] Nedved, R., "Telnet Terminal Location Number Option", RFC 946, Carnegie-Mellon University, May 1985.
- [RDC1041] Rekhter, J., "Telnet 3270 Regime Option", RFC 1041, IBM, January 1988.
- [RFC1043] Yasuda, A., and T. Thompson, "TELNET Data Entry Terminal Option DODIIS Implementation", RFC 1043, DIA, February 1988.
- [RFC1053] Levy, S., and T. Jacobson, "Telnet X.3 PAD Option", RFC 1053, Minnesota Supercomputer Center, April 1988.
- [RFC1073] Waitzman, D., "Telnet Window Size Option", RFC 1073, BBN STC, October, 1988.
- [RFC1079] Hedrick, C., "Telnet Terminal Speed Option", RFC 1079, Rutgers University, December 1988.
- [RFC1091] VanBokkelen, J., "Telnet Terminal Type Option", RFC 1091, FTP Software, Inc., February 1989.
- [RFC1096] Marcy, G., "Telnet X Display Location Option", RFC 1096, Carnegie Mellon University, March 1989.
- [RFC1184] Borman, D., Editor, "Telnet Linemode Option", RFC 1184, Cray Research, Inc., October 1990.
- [RFC1372] Hedrick, C., and D. Borman, "Telnet Remote Flow Control Option", RFC 1372, Rutgers University, Cray Research, Inc., October 1992.

- [RFC1408] Borman, D., Editor, "Telnet Environment Option", RFC 1408, Cray Research, Inc., January 1993.
- [RFC1409] Borman, D., Editor, "Telnet Authentication Option", RFC 1409, Cray Research, Inc., January 1993.
- [RFC1572] Alexander, S., Editor, "Telnet Environment Option", RFC1572, Lachman Technology, Inc., January 1994.
- [RFC1647] Kelly, B., "TN3270 Enhancements", RFC1647, Auburn University, July 1994.

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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]

REFERENCES

- [RFC1034] Mockapetris, P., "Domain Names - Concepts and Facilities", STD 13, RFC 1034, USC/Information Sciences Institute, November 1987.
- [RFC1035] Mockapetris, P., "Domain Names - Implementation and Specification", STD 13, RFC 1035, USC/Information Sciences Institute, November 1987.
- [RFC1183] Everhart, C., Mamakos, L., Ullmann, R., and P. Mockapetris, Editors, "New DNS RR Definitions", RFC 1183, Transarc, University of Maryland, Prime Computer, USC/Information Sciences Institute, October 1990.
- [RFC1348] Manning, B., "DNS NSAP RRs", RFC 1348, Rice University, July 1992.
- [RFC1664] Allocchio, C., Bonito, A., Cole, B., Giordano, S., and R. Hagens, "Using the Internet DNS to Distribute RFC1327 Mail Address Mapping Tables", GARR-Italy, Cisco Systems Inc., Centro Svizzero Calcolo Scientifico, Advanced Network & Services, August 1994.

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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	FORTTRAN 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 Language 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 address
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 Microsystems, 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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URL = <ftp://ftp.isi.edu/in-notes/iana/assignments/address-family-numbers>

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.

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

DIRECTORY SYSTEM NAMES

In the representation of distinguished 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] establishes 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 Shortest Path First (OSPF) protocols has a provision for authentication, and the type of authentication can be 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.

```

| -application-
| -audio-----
| -image-----
| -media-types-| -message-----
|               | -multipart---
|               | -text-----
|               | -video-----

```

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

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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[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 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	[RFC1345,KXS2]
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 Source: ECMA registry Alias: ref	[RFC1345,KXS2]

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: 13

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: 14

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
Source: ECMA registry
Alias: iso-ir-146
Alias: serbian

[RFC1345,KXS2]

Name: JUS_I.B1.003-mac
Source: ECMA registry
Alias: macedonian
Alias: iso-ir-147

[RFC1345,KXS2]

Name: ISO_8859-9:1989
Source: ECMA registry
Alias: iso-ir-148
Alias: ISO_8859-9
Alias: ISO-8859-9
Alias: latin5
Alias: l5

[RFC1345,KXS2]

Name: greek-ccitt
Source: ECMA registry
Alias: iso-ir-150

[RFC1345,KXS2]

Name: NC_NC00-10:81
Source: ECMA registry
Alias: cuba
Alias: iso-ir-151
Alias: ISO646-CU

[RFC1345,KXS2]

Name: ISO_6937-2-25
Source: ECMA registry
Alias: iso-ir-152

[RFC1345,KXS2]

Name: GOST_19768-74
Source: ECMA registry
Alias: ST_SEV_358-88
Alias: iso-ir-153

[RFC1345,KXS2]

Name: ISO_8859-supp
Source: ECMA registry
Alias: iso-ir-154
Alias: latin1-2-5

[RFC1345,KXS2]

Name: ISO_10367-box
Source: ECMA registry
Alias: iso-ir-155

[RFC1345,KXS2]

Name: latin6 [RFC1345,KXS2]
Source: ECMA registry
Alias: iso-ir-157
Alias: 16

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

REFERENCES

- [RFC1345] Simonsen, K., "Character Mnemonics & Character Sets", RFC 1345, Rationel Almen Planlaegning, Rationel Almen Planlaegning, June 1992.
- [RFC1428] Vaudreuil, G., "Transition of Internet Mail from Just-Send-8 to 8bit-SMTP/MIME", RFC1428, CNRI, February 1993.
- [RFC1456] Vietnamese Standardization Working Group, "Conventions for Encoding the Vietnamese Language VISCII: Vietnamese Standard Code for Information Interchange VIQR: Vietnamese Quoted-Readable Specification Revision 1.1", RFC 1456, May 1993.
- [RFC1468] Murai, J., Crispin, M., and E. van der Poel, "Japanese Character Encoding for Internet Messages", RFC 1468,

Keio University, Panda Programming, June 1993.

- [RFC1489] Chernov, A., "Registration of a Cyrillic Character Set", RFC1489, RELCOM Development Team, July 1993.
- [RFC1554] Ohta, M., and K. Handa, "ISO-2022-JP-2: Multilingual Extension of ISO-2022-JP", RFC1554, Tokyo Institute of Technology, ETL, December 1993.
- [RFC1556] Nussbacher, H., "Handling of Bi-directional Texts in MIME", RFC1556, Israeli Inter-University, December 1993.
- [RFC1557] Choi, U., Chon, K., and H. Park, "Korean Character Encoding for Internet Messages", KAIST, Solvit Chosun Media, December 1993.
- [RFC1641] Goldsmith, D., and M. Davis, "Using Unicode with MIME", RFC1641, Taligent, Inc., July 1994.
- [RFC1642] Goldsmith, D., and M. Davis, "UTF-7", RFC1642, Taligent, Inc., July 1994.

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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 Identification 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 parameters 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 interface 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	dsl	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	smads-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	smads-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 network 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 {applUDPProtoID 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. {applUDPPProtoID 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 {applUDPPProtoID 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 applUDPPProtoID 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	stIIimib	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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REFERENCES

- [1] Miller, S.P., B.C. Neuman, J.I. Schiller, and J.H. Saltzer,
 "Project Athena Technical Plan Section E.2.1: Kerberos
 Authentication and Authorization System", Project Athena,

MIT, December 1987.

- [2] Kohl, J., and B.C. Neuman, "The Kerberos Network Authentication Service (V5)" work in progress, September 1992.
- [RFC1028] Davin, J., J. Case, M. Fedor, and M. Schoffstall, "A Simple Gateway Monitoring Protocol", RFC 1028, Proteon, Inc., University of Tennessee at Knoxville, Cornell University, Rensselaer Polytechnic Institute, November 1987.
- [RFC1095] Warriar, U., and L. Besaw, "The Common Management Information Services and Protocol over TCP/IP (CMOT)", RFC 1095, Unisys Corp., Hewlett-Packard, April 1989.
- [RFC1155] Rose, M., and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based internets", STD 16, RFC 1155, Performance Systems International, Hughes LAN Systems, May 1990.
- [RFC1157] Case, J., M. Fedor, M. Schoffstall, and J. Davin, "A Simple Network Management Protocol", STD 15, RFC 1157, SNMP Research, Performance Systems International, Performance Systems International, MIT Laboratory for Computer Science, May 1990.
- [RFC1213] McCloghrie, K., and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets: MIB-II", STD 17, RFC 1213, Hughes LAN Systems, Performance Systems International, March 1991.
- [RFC1229] McCloghrie, K., Editor, "Extensions to the Generic-Interface MIB", RFC 1229, Hughes LAN Systems, Inc., May 1991.
- [RFC1230] McCloghrie, K., and R. Fox, "IEEE 802.4 Token Bus MIB", RFC 1230, Hughes LAN Systems, Inc., Synoptics, Inc., May 1991.
- [RFC1231] McCloghrie, K., Fox, R., and E. Decker, "IEEE 802.5 Token Ring MIB", RFC 1231, Hughes LAN Systems, Inc., Synoptics, Inc., cisco Systems, Inc., May 1991.
- [RFC1239] Reynolds, J., "Reassignment of Experimental MIBs to Standard MIBs", RFC 1239, USC/Information Sciences Institute, ISI, June 1991.
- [RFC1243] Waldbusser, S., Editor, "AppleTalk Management Information Base", RFC 1243, Carnegie Mellon University, July 1991.

- [RFC1253] Baker, F., and R. Coltun, "OSPF Version 2 Management Information Base", RFC 1253, ACC, Computer Science Center, August 1991.
- [RFC1271] Waldbusser, S., "Remote Network Monitoring Management Information Base", RFC 1271, Carnegie Mellon University, November 1991.
- [RFC1284] Cook, J., Editor, "Definitions of Managed Objects for the Ethernet-like Interface Types", RFC 1284, Chipcom Corporation, December 1991.
- [RFC1285] Case, J., "FDDI Management Information Base", RFC 1285, SNMP Research, Incorporated, January 1992.
- [RFC1286] Decker, E., Langille, P., Rijsinghani, A., and K. McCloghrie, "Definitions of Managed Objects for Bridges", RFC 1286, cisco Systems, Inc., DEC, Hughes LAN Systems, Inc., December 1991.
- [RFC1304] Cox, T., and K. Tesnik, Editors, "Definitions of Managed Objects for the SIP Interface Type", RFC 1304, Bell Communications Research, February 1992.
- [RFC1315] Brown, C., Baker, F., and C. Carvalho, "Management Information Base for Frame Relay DTEs", RFC 1315, Wellfleet Communications, Inc., Advanced Computer Communications, April 1992.
- [RFC1353] McCloghrie, K., Davin, J., and J. Galvin, "Definitions of Managed Objects for Administration of SNMP Parties", RFC 1353, Hughes LAN Systems, Inc., MIT Laboratory for Computer Science, Trusted Information Systems, Inc., July 1992.
- [RFC1381] Throop, D., and F. Baker, "SNMP MIB Extension for X.25 LAPB", RFC 1381, Data General Corporation, Advanced Computer Communications, November 1992.
- [RFC1382] Throop, D., Editor, "SNMP MIB Extension for the X.25 Packet Layer", RFC 1382, Data General Corporation, November 1992.
- [RFC1389] Malkin, G., and F. Baker, "RIP Version 2 MIB Extension", RFC 1389, Xylogics, Inc., Advanced Computer Communications, January 1993.
- [RFC1406] Baker, F., and J. Watt, Editors, "Definitions of Managed Objects for the DS1 and E1 Interface Types", RFC 1406,

Advanced Computer Communications, Newbridge Networks Corporation, January 1993.

- [RFC1407] Cox, T., and K. Tesink, "Definitions of Managed Objects for the DS3/E3 Interface Type", RFC 1407, Bell Communications Research, January 1993.
- [RFC1414] St. Johns, M., and M. Rose, "Identification MIB", RFC 1414, US Department of Defense, Dover Beach Consulting, Inc., February 1993.
- [RFC1461] Throop, D., "SNMP MIB extension for Multiprotocol Interconnect over X.25", RFC 1461, Data General Corporation, May 1993.
- [RFC1471] Kastenholz, F., "The Definitions of Managed Objects for the Link Control Protocol of the Point-to-Point Protocol", RFC 1471, FTP Software, Inc., June 1993.
- [RFC1472] Kastenholz, F., "The Definitions of Managed Objects for the Security Protocols of the Point-to-Point Protocol", RFC 1472, FTP Software, Inc., June 1993.
- [RFC1473] Kastenholz, F., "The Definitions of Managed Objects for the IP Network Control Protocol of the Point-to-Point Protocol", RFC 1473, FTP Software, Inc., June 1993.
- [RFC1474] Kastenholz, F., "The Definitions of Managed Objects for the Bridge Network Control Protocol of the Point-to-Point Protocol" RFC 1474, FTP Software, Inc., June 1993.
- [RFC1514] Grillo, P., and S. Waldbusser, "Host Resources MIB", RFC 1514, Network Innovations, Intel Corporation, Carnegie Mellon University, September 1993.
- [RFC1515] McMaster, D., McCloghrie, K., and S. Roberts, "Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)", RFC 1515, SynOptics Communications, Inc., Hughes LAN Systems, Inc., Farallon Computing, Inc., September 1993.
- [RFC1516] McMaster, D., and K. McCloghrie, "Definitions of Managed Objects for IEEE 802.3 Repeater Devices", RFC 1516, SynOptics Communications, Inc., Hughes LAN Systems, Inc., September 1993.
- [RFC1559] Saperia, J., "DECnet Phase IV MIB Extensions", RFC 1559, Digital Equipment Corporation, December 1993.

- [RFC1565] Kille, S., WG Chair, and N. Freed, Editor, "Network Services Monitoring MIB", RFC 1565, ISODE Consortium and Innosoft, January 1994.
- [RFC1566] Kille, S., WG Chair, and N. Freed, Editor, "Mail Monitoring MIB", RFC 1566, ISODE Consortium, Innosoft, January 1994.
- [RFC1567] Mansfield, G., and S. Kille, "X.500 Directory Monitoring MIB", RFC 1567, AIC Systems Laboratory, ISODE Consortium, January 1994.
- [RFC1573] McCloghrie, K., and F. Kastenholz, "Evolution of the Interfaces Group of MIB-II", RFC 1573, Hughes LAN Systems, FTP Software, January 1994.
- [RFC1595] Brown, T., and K. Tesink, Editors, "Definitions of Managed Objects for the SONET/SDH Interface Type", RFC 1595, Bell Communications Research, March 1994.
- [RFC1596] Brown, T., Editor, "Definitions of Managed Objects for Frame Relay Service", RFC 1596, Bell Communications Research, March 1994.
- [RFC1611] Austein, R., and J. Saperia, "DNS Server MIB Extensions", RFC 1611, Epilogue Technology Corporation, Digital Equipment Corporation, May 1994.
- [RFC1628] Case, J., Editor, "UPS Management Information Base", RFC 1628, SNMP Research, Incorporated, May 1994.
- [RFC1650] Kastenholz, F., "Definitions of Managed Objects for the Ethernet-like Interface Types using SMiv2", RFC 1650, FTP Software, Inc., August 1994.
- [RFC1657] Willis, S., Burruss, J., and J. Chu, Editor, "Definitions of Managed Objects for the Fourth Version of the Border Gateway Protocol (BGP-4) using SMiv2", RFC 1657, Wellfleet Communications Inc., IBM Corp., July 1994.
- [RFC1658] Stewart, B., "Definitions of Managed Objects for Character Stream Devices using SMiv2", RFC 1658, Xyplex, Inc., July 1994.
- [RFC1659] Stewart, B., "Definitions of Managed Objects for RS-232-like Hardware Devices using SMiv2", RFC 1659, Xyplex, Inc., July 1994.
- [RFC1660] Stewart, B., "Definitions of Managed Objects for

Parallel-printer-like Hardware Devices using SMIV2", RFC 1660, Xyplex, Inc., July 1994.

- [RFC1665] Kielczewski, Z., Kostick, D., and K. Shih, Editors, "Definitions of Managed Objects for SNA NAUs using SMIV2", RFC 1665, Eicon Technology Corporation, Bell Communications Research, Novell, July 1994.
- [RFC1694] Brown, T., and K. Tesink, Editors, "Definitions of Managed Objects for SMDS Interfaces using SMIV2", RFC 1694, Bell Communications Research, August 1994.
- [RFC1695] Ahmed, M., and K. Tesink, Editors, "Definitions of Managed Objects for ATM Management Version 8.0 using SMIV2", RFC 1695, Bell Communications Research, August 1994.
- [RFC1696] Barnes, J., Brown, L., Royston, R., and S. Waldbusser, "Modem Management Information Base (MIB) using SMIV2", RFC 1696, Xylogics, Inc., Motorola, US Robotics, Inc., Carnegie Mellon University, August 1994.
- [RFC1697] Brower, D., Editor, Purvy, B., RDBMSMIB Working Group Chair, Daniel, A., Sinykin, M., and J. Smith, "Relational Database Management System (RDBMS) Management Information Base (MIB) using SMIV2", RFC 1697, The ASK Group, INGRES DBMS Development, Oracle Corporation, Informix Software, Inc., Oracle Corporation, August 1994.

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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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URL = <ftp://ftp.isi.edu/in-notes/iana/assignments/enterprise-numbers>

SGMP Vendor Specific Codes: [obsolete]

Prefix: 1,255,

Decimal	Name	References
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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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URL = <ftp://ftp.isi.edu/in-notes/iana/assignments/sgmp-vendor-specific-codes>

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 RESOLUTION 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	HDLCL	[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

- [RFC826] Plummer, D., "An Ethernet Address Resolution Protocol or Converting Network Protocol Addresses to 48-bit Ethernet Addresses for Transmission on Ethernet Hardware", STD 37, RFC 826, MIT-LCS, November 1982.
- [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.

PEOPLE

- [AGM] Andy Malis <malis_a@timeplex.com>
- [GXC1] George Clapp <meritec!clapp@bellcore.bellcore.com>
- [GXP] Gill Pratt <gill%mit-ccc@MC.LCS.MIT.EDU>
- [JBP] Jon Postel <postel@isi.edu>
- [JKR1] Joyce K. Reynolds <jkrey@isi.edu>

[JXM] Joseph Murdock <---none--->

[MXB1] Mike Burrows <burrows@SRC.DEC.COM>

[P XK] Philip Koch <Philip.Koch@DARTMOUTH.EDU>

[RXD2] Rajiv Dhingra <rajiv@ULTRA.COM>

[TU] Tom Unger <tom@CITI.UMICH>

[David Brownell]

[Mark Laubach]

[Yakov Rekhter] <Yakov@IBM.COM>

[]

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	Internet			
binary	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.

PEOPLE

- [JBP] Jon Postel <postel@isi.edu>
- [JXJ] <mystery contact>
- []

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]
32966	80C6	-	-	Pacer Software	[XEROX]
32967	80C7	-	-	Applitek Corporation	[XEROX]
32968	80C8-80CC	-	-	Intergraph Corporation	[XEROX]
32973	80CD-80CE	-	-	Harris Corporation	[XEROX]
32975	80CF-80D2	-	-	Taylor Instrument	[XEROX]
32979	80D3-80D4	-	-	Rosemount Corporation	[XEROX]
32981	80D5	-	-	IBM SNA Service on Ether	[XEROX]
32989	80DD	-	-	Varian Associates	[XEROX]
32990	80DE-80DF	-	-	Integrated Solutions TRFS	[XEROX]
32992	80E0-80E3	-	-	Allen-Bradley	[XEROX]
32996	80E4-80F0	-	-	Datability	[XEROX]
33010	80F2	-	-	Retix	[XEROX]
33011	80F3	-	-	AppleTalk AARP (Kinetics)	[XEROX]
33012	80F4-80F5	-	-	Kinetics	[XEROX]
33015	80F7	-	-	Apollo Computer	[XEROX]
33023	80FF-8103	-	-	Wellfleet Communications	[XEROX]
33031	8107-8109	-	-	Symbolics Private	[XEROX]
33072	8130	-	-	Hayes Microcomputers	[XEROX]
33073	8131	-	-	VG Laboratory Systems	[XEROX]
	8132-8136			Bridge Communications	[XEROX]
33079	8137-8138	-	-	Novell, Inc.	[XEROX]
33081	8139-813D	-	-	KTI	[XEROX]
	8148			Logicraft	[XEROX]
	8149			Network Computing Devices	[XEROX]
	814A			Alpha Micro	[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 System	[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.

IEEE Registration Authority
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445 Hoes Lane, P.O. Box 1331
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Fax: +1 908 562 1571

IANA ETHERNET ADDRESS BLOCK

The IANA owns an Ethernet address block which may be used for multicast address assignments 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 Industries 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 Hardware (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-	????	Stanford reserved
09-00-56-FE-FF-FF		
09-00-56-FF-00-00-	805C	Stanford V Kernel, version 6.0
09-00-56-FF-FF-FF		
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	????	Reserved DEC through
AB-00-03-FF-FF-FF		
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] Deering, 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 recommendations (such as X.29)
- 01 - Reserved for use by "national" administrative authorities
- 10 - Reserved for use by international administrative authorities
- 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., "PPP in 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	DFVLR SUN-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-HANOV	[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 octets 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 representation 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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[RXM] Robert Myhill <Myhill@CCS.BBN.COM>

[XEROX] Fonda Pallone <---none--->

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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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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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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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NOVELL SAP NUMBERS OF INTEREST

For the convenience of the Internet community the IANA maintains 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	VirusSafe 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 canonical addresses
2	IEEE 802.4 with canonical addresses
3	IEEE 802.5 with non-canonical addresses
4	FDDI with non-canonical addresses
5-10	reserved
11	IEEE 802.5 with canonical addresses
12	FDDI with canonical 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.

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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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URL = <ftp://ftp.isi.edu/in-notes/iana/assignments/machine-names>

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
CHRYSLIS
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

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

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

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.

[]

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 Mgmt 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

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 Hyperchannel
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 Resolution 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

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

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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URL = <ftp://ftp.isi.edu/in-notes/iana/assignments/service-names>

Security Considerations

Security issues are not discussed in this memo.

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