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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.

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## INTRODUCTION

This Network Working Group Request for Comments documents the currently assigned values from several series of numbers used in network protocol implementations. This RFC will be updated periodically, and in any case current information can be obtained from the Internet Assigned Numbers Authority (IANA). If you are developing a protocol or application that will require the use of a link, socket, port, protocol, etc., please contact the IANA to receive a number assignment.

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Most of the protocols mentioned here are documented in the RFC series of notes. Some of the items listed are undocumented. Further information on protocols can be found in the memo "IAB Official Protocol Standards" [62].

In the entries below, the name and mailbox of the responsible individual is indicated. The bracketed entry, e.g., [nn,iii], at the right hand margin of the page indicates a reference for the listed protocol, where the number ("nn") cites the document and the letters ("iii") cites the person. Whenever possible, the letters are a NIC Ident as used in the WhoIs (NICNAME) service.



Special Addresses:

There are five classes of IP addresses: Class A through Class E [119]. Of these, Class E addresses are reserved for experimental use. A gateway which is not participating in these experiments must ignore all datagrams with a Class E destination IP address. ICMP Destination Unreachable or ICMP Redirect messages must not result from receiving such datagrams.

There are certain special cases for IP addresses [11]. 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

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

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

(a)  $\{0, 0\}$

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

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

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.

## VERSION NUMBERS

In the Internet Protocol (IP) [45,105] 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	[105,JBP]
5	ST	ST Datagram Mode	[49,JWF]
6-14		Unassigned	[JBP]
15		Reserved	[JBP]

## PROTOCOL NUMBERS

In the Internet Protocol (IP) [45,105] there is a field, called Protocol, to identify the 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	[97,JBP]
2	IGMP	Internet Group Management	[43,JBP]
3	GGP	Gateway-to-Gateway	[60,MB]
4	IP	IP in IP (encasulation)	[JBP]
5	ST	Stream	[49,JWF]
6	TCP	Transmission Control	[106,JBP]
7	UCL	UCL	[PK]
8	EGP	Exterior Gateway Protocol	[123,DLM1]
9	IGP	any private interior gateway	[JBP]
10	BBN-RCC-MON	BBN RCC Monitoring	[SGC]
11	NVP-II	Network Voice Protocol	[22,SC3]
12	PUP	PUP	[8,XEROX]
13	ARGUS	ARGUS	[RWS4]
14	EMCON	EMCON	[BN7]
15	XNET	Cross Net Debugger	[56,JFH2]
16	CHAOS	Chaos	[NC3]
17	UDP	User Datagram	[104,JBP]
18	MUX	Multiplexing	[23,JBP]
19	DCN-MEAS	DCN Measurement Subsystems	[DLM1]
20	HMP	Host Monitoring	[59,RH6]
21	PRM	Packet Radio Measurement	[ZSU]
22	XNS-IDP	XEROX NS IDP	[133,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	[138,RH6]
28	IRTP	Internet Reliable Transaction	[79,TXM]
29	ISO-TP4	ISO Transport Protocol Class 4	[63,RC77]
30	NETBLT	Bulk Data Transfer Protocol	[20,DDC1]
31	MFE-NSP	MFE Network Services Protocol	[124,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]
41-60		Unassigned	[JBP]
61		any host internal protocol	[JBP]
62	CFTP	CFTP	[50,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	[74,ML109]
87	TCF	TCF	[GAL5]
88	IGRP	IGRP	[18,GXS]
89	OSPFIGP	OSPFIGP	[83,JTM4]
90	Sprite-RPC	Sprite RPC Protocol	[143,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	[JXI1]
95	MICP	Mobile Internetworking Control Pro.	[JXI1]
96	AES-SP3-D	AES Security Protocol 3-D	[HXH]
97	ETHERIP	Ethernet-within-IP Encapsulation	[RXH1]
98	ENCAP	Encapsulation Header	[148,RXB3]
99-254		Unassigned	[JBP]
255		Reserved	[JBP]

## 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 [45,106] 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 [46,104].

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	[JBP]
	0/udp	Reserved	[JBP]
tcpmux	1/tcp	TCP Port Service Multiplexer	[MKL]
tcpmux	1/udp	TCP Port Service Multiplexer	[MKL]
compressnet	2/tcp	Management Utility	[BV15]
compressnet	2/udp	Management Utility	[BV15]
compressnet	3/tcp	Compression Process	[BV15]
compressnet	3/udp	Compression Process	[BV15]
	4/tcp	Unassigned	[JBP]
	4/udp	Unassigned	[JBP]
rje	5/tcp	Remote Job Entry	[12,JBP]
rje	5/udp	Remote Job Entry	[12,JBP]
	6/tcp	Unassigned	[JBP]
	6/udp	Unassigned	[JBP]
echo	7/tcp	Echo	[95,JBP]
echo	7/udp	Echo	[95,JBP]
	8/tcp	Unassigned	[JBP]
	8/udp	Unassigned	[JBP]
discard	9/tcp	Discard	[94,JBP]
discard	9/udp	Discard	[94,JBP]
	10/tcp	Unassigned	[JBP]
	10/udp	Unassigned	[JBP]
systat	11/tcp	Active Users	[89,JBP]

systat	11/udp	Active Users	[89,JBP]
	12/tcp	Unassigned	[JBP]
	12/udp	Unassigned	[JBP]
daytime	13/tcp	Daytime	[93,JBP]
daytime	13/udp	Daytime	[93,JBP]
	14/tcp	Unassigned	[JBP]
	14/udp	Unassigned	[JBP]
	15/tcp	Unassigned [was netstat]	[JBP]
	15/udp	Unassigned	[JBP]
	16/tcp	Unassigned	[JBP]
	16/udp	Unassigned	[JBP]
qotd	17/tcp	Quote of the Day	[100,JBP]
qotd	17/udp	Quote of the Day	[100,JBP]
msp	18/tcp	Message Send Protocol	[RXN]
msp	18/udp	Message Send Protocol	[RXN]
chargen	19/tcp	Character Generator	[92,JBP]
chargen	19/udp	Character Generator	[92,JBP]
ftp-data	20/tcp	File Transfer [Default Data]	[96,JBP]
ftp-data	20/udp	File Transfer [Default Data]	[96,JBP]
ftp	21/tcp	File Transfer [Control]	[96,JBP]
ftp	21/udp	File Transfer [Control]	[96,JBP]
	22/tcp	Unassigned	[JBP]
	22/udp	Unassigned	[JBP]
telnet	23/tcp	Telnet	[112,JBP]
telnet	23/udp	Telnet	[112,JBP]
	24/tcp	any private mail system	[RA11]
	24/udp	any private mail system	[RA11]
smtp	25/tcp	Simple Mail Transfer	[102,JBP]
smtp	25/udp	Simple Mail Transfer	[102,JBP]
	26/tcp	Unassigned	[JBP]
	26/udp	Unassigned	[JBP]
nsw-fe	27/tcp	NSW User System FE	[24,RHT]
nsw-fe	27/udp	NSW User System FE	[24,RHT]
	28/tcp	Unassigned	[JBP]
	28/udp	Unassigned	[JBP]
msg-icp	29/tcp	MSG ICP	[85,RHT]
msg-icp	29/udp	MSG ICP	[85,RHT]
	30/tcp	Unassigned	[JBP]
	30/udp	Unassigned	[JBP]
msg-auth	31/tcp	MSG Authentication	[85,RHT]
msg-auth	31/udp	MSG Authentication	[85,RHT]
	32/tcp	Unassigned	[JBP]
	32/udp	Unassigned	[JBP]
dsp	33/tcp	Display Support Protocol	[EXC]
dsp	33/udp	Display Support Protocol	[EXC]
	34/tcp	Unassigned	[JBP]
	34/udp	Unassigned	[JBP]
	35/tcp	any private printer server	[JBP]

	35/udp	any private printer server	[JBP]
	36/tcp	Unassigned	[JBP]
	36/udp	Unassigned	[JBP]
time	37/tcp	Time	[108,JBP]
time	37/udp	Time	[108,JBP]
	38/tcp	Unassigned	[JBP]
	38/udp	Unassigned	[JBP]
rlp	39/tcp	Resource Location Protocol	[MA]
rlp	39/udp	Resource Location Protocol	[MA]
	40/tcp	Unassigned	[JBP]
	40/udp	Unassigned	[JBP]
graphics	41/tcp	Graphics	[129,JBP]
graphics	41/udp	Graphics	[129,JBP]
nameserver	42/tcp	Host Name Server	[99,JBP]
nameserver	42/udp	Host Name Server	[99,JBP]
nickname	43/tcp	Who Is	[55,ANM2]
nickname	43/udp	Who Is	[55,ANM2]
mpm-flags	44/tcp	MPM FLAGS Protocol	[JBP]
mpm-flags	44/udp	MPM FLAGS Protocol	[JBP]
mpm	45/tcp	Message Processing Module [recv]	[98,JBP]
mpm	45/udp	Message Processing Module [recv]	[98,JBP]
mpm-snd	46/tcp	MPM [default send]	[98,JBP]
mpm-snd	46/udp	MPM [default send]	[98,JBP]
ni-ftp	47/tcp	NI FTP	[134,SK8]
ni-ftp	47/udp	NI FTP	[134,SK8]
	48/tcp	Unassigned	[JBP]
	48/udp	Unassigned	[JBP]
login	49/tcp	Login Host Protocol	[PHD1]
login	49/udp	Login Host Protocol	[PHD1]
re-mail-ck	50/tcp	Remote Mail Checking Protocol	[171,SXD1]
re-mail-ck	50/udp	Remote Mail Checking Protocol	[171,SXD1]
la-maint	51/tcp	IMP Logical Address Maintenance	[76,AGM]
la-maint	51/udp	IMP Logical Address Maintenance	[76,AGM]
xns-time	52/tcp	XNS Time Protocol	[SXA]
xns-time	52/udp	XNS Time Protocol	[SXA]
domain	53/tcp	Domain Name Server	[81,95,PM1]
domain	53/udp	Domain Name Server	[81,95,PM1]
xns-ch	54/tcp	XNS Clearinghouse	[SXA]
xns-ch	54/udp	XNS Clearinghouse	[SXA]
isi-gl	55/tcp	ISI Graphics Language	[7,RB9]
isi-gl	55/udp	ISI Graphics Language	[7,RB9]
xns-auth	56/tcp	XNS Authentication	[SXA]
xns-auth	56/udp	XNS Authentication	[SXA]
	57/tcp	any private terminal access	[JBP]
	57/udp	any private terminal access	[JBP]
xns-mail	58/tcp	XNS Mail	[SXA]
xns-mail	58/udp	XNS Mail	[SXA]
	59/tcp	any private file service	[JBP]

	59/udp	any private file service	[JBP]
	60/tcp	Unassigned	[JBP]
	60/udp	Unassigned	[JBP]
ni-mail	61/tcp	NI MAIL	[5,SK8]
ni-mail	61/udp	NI MAIL	[5,SK8]
acas	62/tcp	ACA Services	[EXW]
acas	62/udp	ACA Services	[EXW]
via-ftp	63/tcp	VIA Systems - FTP	[DXD]
via-ftp	63/udp	VIA Systems - FTP	[DXD]
covia	64/tcp	Communications Integrator (CI)	[TXD]
covia	64/udp	Communications Integrator (CI)	[TXD]
tacacs-ds	65/tcp	TACACS-Database Service	[3,KH43]
tacacs-ds	65/udp	TACACS-Database Service	[3,KH43]
sql*net	66/tcp	Oracle SQL*NET	[JFH2]
sql*net	66/udp	Oracle SQL*NET	[JFH2]
bootps	67/tcp	Bootstrap Protocol Server	[36,WJC2]
bootps	67/udp	Bootstrap Protocol Server	[36,WJC2]
bootpc	68/tcp	Bootstrap Protocol Client	[36,WJC2]
bootpc	68/udp	Bootstrap Protocol Client	[36,WJC2]
tftp	69/tcp	Trivial File Transfer	[126,DDC1]
tftp	69/udp	Trivial File Transfer	[126,DDC1]
gopher	70/tcp	Gopher	[MXC1]
gopher	70/udp	Gopher	[MXC1]
netrjs-1	71/tcp	Remote Job Service	[10,RTB3]
netrjs-1	71/udp	Remote Job Service	[10,RTB3]
netrjs-2	72/tcp	Remote Job Service	[10,RTB3]
netrjs-2	72/udp	Remote Job Service	[10,RTB3]
netrjs-3	73/tcp	Remote Job Service	[10,RTB3]
netrjs-3	73/udp	Remote Job Service	[10,RTB3]
netrjs-4	74/tcp	Remote Job Service	[10,RTB3]
netrjs-4	74/udp	Remote Job Service	[10,RTB3]
	75/tcp	any private dial out service	[JBP]
	75/udp	any private dial out service	[JBP]
	76/tcp	Unassigned	[JBP]
	76/udp	Unassigned	[JBP]
	77/tcp	any private RJE service	[JBP]
	77/udp	any private RJE service	[JBP]
vettcp	78/tcp	vettcp	[CXL1]
vettcp	78/udp	vettcp	[CXL1]
finger	79/tcp	Finger	[52,KLH]
finger	79/udp	Finger	[52,KLH]
www	80/tcp	World Wide Web HTTP	[TXL]
www	80/udp	World Wide Web HTTP	[TXL]
hosts2-ns	81/tcp	HOSTS2 Name Server	[EAK1]
hosts2-ns	81/udp	HOSTS2 Name Server	[EAK1]
xfer	82/tcp	XFER Utility	[TXS2]
xfer	82/udp	XFER Utility	[TXS2]
mit-ml-dev	83/tcp	MIT ML Device	[DXR3]

mit-ml-dev	83/udp	MIT ML Device	[DXR3]
ctf	84/tcp	Common Trace Facility	[HXT]
ctf	84/udp	Common Trace Facility	[HXT]
mit-ml-dev	85/tcp	MIT ML Device	[DXR3]
mit-ml-dev	85/udp	MIT ML Device	[DXR3]
mfcobol	86/tcp	Micro Focus Cobol	[SXE]
mfcobol	86/udp	Micro Focus Cobol	[SXE]
	87/tcp	any private terminal link	[JBP]
	87/udp	any private terminal link	[JBP]
kerberos	88/tcp	Kerberos	[BCN]
kerberos	88/udp	Kerberos	[BCN]
su-mit-tg	89/tcp	SU/MIT Telnet Gateway	[MRC]
su-mit-tg	89/udp	SU/MIT Telnet Gateway	[MRC]
dnsix	90/tcp	DNSIX Securit Attribute Token Map	[CXW1]
dnsix	90/udp	DNSIX Securit Attribute Token Map	[CXW1]
mit-dov	91/tcp	MIT Dover Spooler	[EBM]
mit-dov	91/udp	MIT Dover Spooler	[EBM]
npp	92/tcp	Network Printing Protocol	[LXM]
npp	92/udp	Network Printing Protocol	[LXM]
dcp	93/tcp	Device Control Protocol	[DT15]
dcp	93/udp	Device Control Protocol	[DT15]
objcall	94/tcp	Tivoli Object Dispatcher	[TXB1]
objcall	94/udp	Tivoli Object Dispatcher	[TXB1]
supdup	95/tcp	SUPDUP	[27,MRC]
supdup	95/udp	SUPDUP	[27,MRC]
dixie	96/tcp	DIXIE Protocol Specification	[TXH1]
dixie	96/udp	DIXIE Protocol Specification	[TXH1]
swift-rvf	97/tcp	Swift Remote Vitural File Protocol	[MXR]
swift-rvf	97/udp	Swift Remote Vitural File Protocol	[MXR]
tacnews	98/tcp	TAC News	[ANM2]
tacnews	98/udp	TAC News	[ANM2]
metagram	99/tcp	Metagram Relay	[GEOF]
metagram	99/udp	Metagram Relay	[GEOF]
newacct	100/tcp	[unauthorized use]	
hostname	101/tcp	NIC Host Name Server	[54,ANM2]
hostname	101/udp	NIC Host Name Server	[54,ANM2]
iso-tsap	102/tcp	ISO-TSAP	[16,MTR]
iso-tsap	102/udp	ISO-TSAP	[16,MTR]
gppitnp	103/tcp	Genesis Point-to-Point Trans Net	[PXM1]
gppitnp	103/udp	Genesis Point-to-Point Trans Net	[PXM1]
acr-nema	104/tcp	ACR-NEMA Digital Imag. & Comm. 300	[PXM1]
acr-nema	104/udp	ACR-NEMA Digital Imag. & Comm. 300	[PXM1]
csnet-ns	105/tcp	Mailbox Name Nameserver	[127,MS56]
csnet-ns	105/udp	Mailbox Name Nameserver	[127,MS56]
3com-tsmux	106/tcp	3COM-TSMUX	[JXS5]
3com-tsmux	106/udp	3COM-TSMUX	[JXS5]
rtelnet	107/tcp	Remote Telnet Service	[101,JBP]
rtelnet	107/udp	Remote Telnet Service	[101,JBP]

snagas	108/tcp	SNA Gateway Access Server	[KXM]
snagas	108/udp	SNA Gateway Access Server	[KXM]
pop2	109/tcp	Post Office Protocol - Version 2	[14,JKR1]
pop2	109/udp	Post Office Protocol - Version 2	[14,JKR1]
pop3	110/tcp	Post Office Protocol - Version 3	[122,MTR]
pop3	110/udp	Post Office Protocol - Version 3	[122,MTR]
sunrpc	111/tcp	SUN Remote Procedure Call	[DXG]
sunrpc	111/udp	SUN Remote Procedure Call	[DXG]
mcidas	112/tcp	McIDAS Data Transmission Protocol	[GXD]
mcidas	112/udp	McIDAS Data Transmission Protocol	[GXD]
auth	113/tcp	Authentication Service	[130,MCSJ]
auth	113/udp	Authentication Service	[130,MCSJ]
audionews	114/tcp	Audio News Multicast	[MXF2]
audionews	114/udp	Audio News Multicast	[MXF2]
sftp	115/tcp	Simple File Transfer Protocol	[73,MKL1]
sftp	115/udp	Simple File Transfer Protocol	[73,MKL1]
ansanotify	116/tcp	ANSA REX Notify	[NXH]
ansanotify	116/udp	ANSA REX Notify	[NXH]
uucp-path	117/tcp	UUCP Path Service	[44,MAE]
uucp-path	117/udp	UUCP Path Service	[44,MAE]
sqlserv	118/tcp	SQL Services	[LXB3]
sqlserv	118/udp	SQL Services	[LXB3]
nntp	119/tcp	Network News Transfer Protocol	[65,PL4]
nntp	119/udp	Network News Transfer Protocol	[65,PL4]
cfdpkt	120/tcp	CFDPKT	[JXO3]
cfdpkt	120/udp	CFDPKT	[JXO3]
erpc	121/tcp	Encore Expedited Remote Pro.Call	[132,JXO]
erpc	121/udp	Encore Expedited Remote Pro.Call	[132,JXO]
smakynet	122/tcp	SMAKYNET	[MXO]
smakynet	122/udp	SMAKYNET	[MXO]
ntp	123/tcp	Network Time Protocol	[80,DLM1]
ntp	123/udp	Network Time Protocol	[80,DLM1]
ansatrader	124/tcp	ANSA REX Trader	[NXH]
ansatrader	124/udp	ANSA REX Trader	[NXH]
locus-map	125/tcp	Locus PC-Interface Net Map Ser	[137,EP53]
locus-map	125/udp	Locus PC-Interface Net Map Ser	[137,EP53]
unitary	126/tcp	Unisys Unitary Login	[FEIL]
unitary	126/udp	Unisys Unitary Login	[FEIL]
locus-con	127/tcp	Locus PC-Interface Conn Server	[137,EP53]
locus-con	127/udp	Locus PC-Interface Conn Server	[137,EP53]
gss-xlicen	128/tcp	GSS X License Verification	[JXL]
gss-xlicen	128/udp	GSS X License Verification	[JXL]
pwdgen	129/tcp	Password Generator Protocol	[141,FJW]
pwdgen	129/udp	Password Generator Protocol	[141,FJW]
cisco-fna	130/tcp	cisco FNATIVE	[WXB]
cisco-fna	130/udp	cisco FNATIVE	[WXB]
cisco-tna	131/tcp	cisco TNATIVE	[WXB]
cisco-tna	131/udp	cisco TNATIVE	[WXB]

cisco-sys	132/tcp	cisco SYSMAINT	[WXB]
cisco-sys	132/udp	cisco SYSMAINT	[WXB]
statsrv	133/tcp	Statistics Service	[DLM1]
statsrv	133/udp	Statistics Service	[DLM1]
ingres-net	134/tcp	INGRES-NET Service	[MXB]
ingres-net	134/udp	INGRES-NET Service	[MXB]
loc-srv	135/tcp	Location Service	[JXP]
loc-srv	135/udp	Location Service	[JXP]
profile	136/tcp	PROFILE Naming System	[LLP]
profile	136/udp	PROFILE Naming System	[LLP]
netbios-ns	137/tcp	NETBIOS Name Service	[JBP]
netbios-ns	137/udp	NETBIOS Name Service	[JBP]
netbios-dgm	138/tcp	NETBIOS Datagram Service	[JBP]
netbios-dgm	138/udp	NETBIOS Datagram Service	[JBP]
netbios-ssn	139/tcp	NETBIOS Session Service	[JBP]
netbios-ssn	139/udp	NETBIOS Session Service	[JBP]
emfis-data	140/tcp	EMFIS Data Service	[GB7]
emfis-data	140/udp	EMFIS Data Service	[GB7]
emfis-cntl	141/tcp	EMFIS Control Service	[GB7]
emfis-cntl	141/udp	EMFIS Control Service	[GB7]
bl-idm	142/tcp	Britton-Lee IDM	[SXS1]
bl-idm	142/udp	Britton-Lee IDM	[SXS1]
imap2	143/tcp	Interim Mail Access Protocol v2	[MRC]
imap2	143/udp	Interim Mail Access Protocol v2	[MRC]
news	144/tcp	News	[JAG]
news	144/udp	News	[JAG]
uaac	145/tcp	UAAC Protocol	[DAG4]
uaac	145/udp	UAAC Protocol	[DAG4]
iso-tp0	146/tcp	ISO-IP0	[86,MTR]
iso-tp0	146/udp	ISO-IP0	[86,MTR]
iso-ip	147/tcp	ISO-IP	[MTR]
iso-ip	147/udp	ISO-IP	[MTR]
cronus	148/tcp	CRONUS-SUPPORT	[135,JXB]
cronus	148/udp	CRONUS-SUPPORT	[135,JXB]
aed-512	149/tcp	AED 512 Emulation Service	[AXB]
aed-512	149/udp	AED 512 Emulation Service	[AXB]
sql-net	150/tcp	SQL-NET	[MXP]
sql-net	150/udp	SQL-NET	[MXP]
hems	151/tcp	HEMS	[87,CXT]
hems	151/udp	HEMS	[87,CXT]
bftp	152/tcp	Background File Transfer Program	[AD14]
bftp	152/udp	Background File Transfer Program	[AD14]
sgmp	153/tcp	SGMP	[37,MS9]
sgmp	153/udp	SGMP	[37,MS9]
netsc-prod	154/tcp	NETSC	[SH37]
netsc-prod	154/udp	NETSC	[SH37]
netsc-dev	155/tcp	NETSC	[SH37]
netsc-dev	155/udp	NETSC	[SH37]

sqlsrv	156/tcp	SQL Service	[CMR]
sqlsrv	156/udp	SQL Service	[CMR]
knet-cmp	157/tcp	KNET/VM Command/Message Protocol	[77,GSM11]
knet-cmp	157/udp	KNET/VM Command/Message Protocol	[77,GSM11]
pcmail-srv	158/tcp	PCMail Server	[19,MXL]
pcmail-srv	158/udp	PCMail Server	[19,MXL]
nss-routing	159/tcp	NSS-Routing	[JXR]
nss-routing	159/udp	NSS-Routing	[JXR]
sgmp-traps	160/tcp	SGMP-TRAPS	[37,MS9]
sgmp-traps	160/udp	SGMP-TRAPS	[37,MS9]
snmp	161/tcp	SNMP	[15,MTR]
snmp	161/udp	SNMP	[15,MTR]
snmptrap	162/tcp	SNMPTRAP	[15,MTR]
snmptrap	162/udp	SNMPTRAP	[15,MTR]
cmip-man	163/tcp	CMIP/TCP Manager	[4,AXB1]
cmip-man	163/udp	CMIP/TCP Manager	[4,AXB1]
cmip-agent	164/tcp	CMIP/TCP Agent	[4,AXB1]
smip-agent	164/udp	CMIP/TCP Agent	[4,AXB1]
xns-courier	165/tcp	Xerox	144, SXA]
xns-courier	165/udp	Xerox	[144, SXA]
s-net	166/tcp	Sirius Systems	[BXL]
s-net	166/udp	Sirius Systems	[BXL]
namp	167/tcp	NAMP	[MS9]
namp	167/udp	NAMP	[MS9]
rsvd	168/tcp	RSVD	[NT12]
rsvd	168/udp	RSVD	[NT12]
send	169/tcp	SEND	[WDW11]
send	169/udp	SEND	[WDW11]
print-srv	170/tcp	Network PostScript	[BKR]
print-srv	170/udp	Network PostScript	[BKR]
multiplex	171/tcp	Network Innovations Multiplex	[KXD]
multiplex	171/udp	Network Innovations Multiplex	[KXD]
cl/1	172/tcp	Network Innovations CL/1	[KXD]
cl/1	172/udp	Network Innovations CL/1	[KXD]
xyplex-mux	173/tcp	Xyplex	[BXS]
xyplex-mux	173/udp	Xyplex	[BXS]
mailq	174/tcp	MAILQ	[RXZ]
mailq	174/udp	MAILQ	[RXZ]
vmnet	175/tcp	VMNET	[CXT]
vmnet	175/udp	VMNET	[CXT]
genrad-mux	176/tcp	GENRAD-MUX	[RXT]
genrad-mux	176/udp	GENRAD-MUX	[RXT]
xdmcp	177/tcp	X Display Manager Control Protocol	[RWS4]
xdmcp	177/udp	X Display Manager Control Protocol	[RWS4]
nextstep	178/tcp	NextStep Window Server	[LXH]
NextStep	178/udp	NextStep Window Server	[LXH]
bgp	179/tcp	Border Gateway Protocol	[KSL]
bgp	179/udp	Border Gateway Protocol	[KSL]

ris	180/tcp	Intergraph	[DXB]
ris	180/udp	Intergraph	[DXB]
unify	181/tcp	Unify	[VXS]
unify	181/udp	Unify	[VXS]
audit	182/tcp	Unisys Audit SITP	[GXG]
audit	182/udp	Unisys Audit SITP	[GXG]
ocbinder	183/tcp	OCBinder	[JX01]
ocbinder	183/udp	OCBinder	[JX01]
ocserver	184/tcp	OCServer	[JX01]
ocserver	184/udp	OCServer	[JX01]
remote-kis	185/tcp	Remote-KIS	[RXD1]
remote-kis	185/udp	Remote-KIS	[RXD1]
kis	186/tcp	KIS Protocol	[RXD1]
kis	186/udp	KIS Protocol	[RXD1]
aci	187/tcp	Application Communication Interface	[RXC1]
aci	187/udp	Application Communication Interface	[RXC1]
mumps	188/tcp	Plus Five's MUMPS	[HS23]
mumps	188/udp	Plus Five's MUMPS	[HS23]
qft	189/tcp	Queued File Transport	[WXS]
qft	189/udp	Queued File Transport	[WXS]
gacp	190/tcp	Gateway Access Control Protocol	[PCW]
cacp	190/udp	Gateway Access Control Protocol	[PCW]
prospero	191/tcp	Prospero	[BCN]
prospero	191/udp	Prospero	[BCN]
osu-nms	192/tcp	OSU Network Monitoring System	[DXK]
osu-nms	192/udp	OSU Network Monitoring System	[DXK]
srmp	193/tcp	Spider Remote Monitoring Protocol	[TXS]
srmp	193/udp	Spider Remote Monitoring Protocol	[TXS]
irc	194/tcp	Internet Relay Chat Protocol	[JX02]
irc	194/udp	Internet Relay Chat Protocol	[JX02]
dn6-nlm-aud	195/tcp	DNSIX Network Level Module Audit	[LL69]
dn6-nlm-aud	195/udp	DNSIX Network Level Module Audit	[LL69]
dn6-smm-red	196/tcp	DNSIX Session Mgt Module Audit Redir	[LL69]
dn6-smm-red	196/udp	DNSIX Session Mgt Module Audit Redir	[LL69]
dls	197/tcp	Directory Location Service	[SXB]
dls	197/udp	Directory Location Service	[SXB]
dls-mon	198/tcp	Directory Location Service Monitor	[SXB]
dls-mon	198/udp	Directory Location Service Monitor	[SXB]
smux	199/tcp	SMUX	[MTR]
smux	199/udp	SMUX	[MTR]
src	200/tcp	IBM System Resource Controller	[GXM]
src	200/udp	IBM System Resource Controller	[GXM]
at-rtmp	201/tcp	AppleTalk Routing Maintenance	[RXC]
at-rtmp	201/udp	AppleTalk Routing Maintenance	[RXC]
at-nbp	202/tcp	AppleTalk Name Binding	[RXC]
at-nbp	202/udp	AppleTalk Name Binding	[RXC]
at-3	203/tcp	AppleTalk Unused	[RXC]
at-3	203/udp	AppleTalk Unused	[RXC]

at-echo	204/tcp	AppleTalk Echo	[RXC]
at-echo	204/udp	AppleTalk Echo	[RXC]
at-5	205/tcp	AppleTalk Unused	[RXC]
at-5	205/udp	AppleTalk Unused	[RXC]
at-zis	206/tcp	AppleTalk Zone Information	[RXC]
at-zis	206/udp	AppleTalk Zone Information	[RXC]
at-7	207/tcp	AppleTalk Unused	[RXC]
at-7	207/udp	AppleTalk Unused	[RXC]
at-8	208/tcp	AppleTalk Unused	[RXC]
at-8	208/udp	AppleTalk Unused	[RXC]
tam	209/tcp	Trivial Authenticated Mail Protocol	[DXB1]
tam	209/udp	Trivial Authenticated Mail Protocol	[DXB1]
z39.50	210/tcp	ANSI Z39.50	[MXN]
z39.50	210/udp	ANSI Z39.50	[MXN]
914c/g	211/tcp	Texas Instruments 914C/G Terminal	[BXH1]
914c/g	211/udp	Texas Instruments 914C/G Terminal	[BXH1]
anet	212/tcp	ATEXSSTR	[JXT]
anet	212/udp	ATEXSSTR	[JXT]
ipx	213/tcp	IPX	[DP666]
ipx	213/udp	IPX	[DP666]
vmpwscs	214/tcp	VM PWSCS	[DXS]
vmpwscs	214/udp	VM PWSCS	[DXS]
softpc	215/tcp	Insignia Solutions	[MXT]
softpc	215/udp	Insignia Solutions	[MXT]
atls	216/tcp	Access Technology License Server	[LXD]
atls	216/udp	Access Technology License Server	[LXD]
dbase	217/tcp	dBASE Unix	[DXG1]
dbase	217/udp	dBASE Unix	[DXG1]
mpp	218/tcp	Netix Message Posting Protocol	[STY]
mpp	218/udp	Netix Message Posting Protocol	[STY]
uarp	219/tcp	Unisys ARPs	[AXM1]
uarp	219/udp	Unisys ARPs	[AXM1]
imap3	220/tcp	Interactive Mail Access Protocol v3	[JXR2]
imap3	220/udp	Interactive Mail Access Protocol v3	[JXR2]
fln-spx	221/tcp	Berkeley rlogind with SPX auth	[KXA]
fln-spx	221/udp	Berkeley rlogind with SPX auth	[KXA]
fsh-spx	222/tcp	Berkeley rshd with SPX auth	[KXA]
fsh-spx	222/udp	Berkeley rshd with SPX auth	[KXA]
cdc	223/tcp	Certificate Distribution Center	[KXA]
cdc	223/udp	Certificate Distribution Center	[KXA]
	224-241	Reserved	[JBP]
sur-meas	243/tcp	Survey Measurement	[6,DDC1]
sur-meas	243/udp	Survey Measurement	[6,DDC1]
link	245/tcp	LINK	[1,RDB2]
link	245/udp	LINK	[1,RDB2]
dsp3270	246/tcp	Display Systems Protocol	[39,WJS1]

dsp3270	246/udp	Display Systems Protocol	[39,WJS1]
	247-255	Reserved	[JBP]
pawserv	345/tcp	Perf Analysis Workbench	
pawserv	345/udp	Perf Analysis Workbench	
zserv	346/tcp	Zebra server	
zserv	346/udp	Zebra server	
fatserve	347/tcp	Fatmen Server	
fatserve	347/udp	Fatmen Server	
clearcase	371/tcp	Clearcase	[DXL1]
clearcase	371/udp	Clearcase	[DXL1]
ulistserv	372/tcp	Unix Listserv	[AXK]
ulistserv	372/udp	Unix Listserv	[AXK]
legent-1	373/tcp	Legent Corporation	[KXB]
legent-1	373/udp	Legent Corporation	[KXB]
legent-2	374/tcp	Legent Corporation	[KXB]
legent-2	374/udp	Legent Corporation	[KXB]
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 privileged 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	
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
timed	525/tcp	timeserver
timed	525/udp	timeserver
tempo	526/tcp	newdate
tempo	526/udp	newdate
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
uucp	540/tcp	uucpd
uucp	540/udp	uucpd
klogin	543/tcp	
klogin	543/udp	
kshell	544/tcp	krcmd
kshell	544/udp	krcmd
new-rwho	550/tcp	new-who
new-rwho	550/udp	new-who
dsf	555/tcp	
dsf	555/udp	
remotefs	556/tcp	rfs server
remotefs	556/udp	rfs server
rmonitor	560/tcp	rmonitord
rmonitor	560/udp	rmonitord
monitor	561/tcp	
monitor	561/udp	
chshell	562/tcp	chcmd
chshell	562/udp	chcmd
9pfs	564/tcp	plan 9 file service
9pfs	564/udp	plan 9 file service
whoami	565/tcp	whoami
whoami	565/udp	whoami
meter	570/tcp	demon
meter	570/udp	demon
meter	571/tcp	udemon
meter	571/udp	udemon

ipcserv	600/tcp	Sun IPC server	
ipcserv	600/udp	Sun IPC server	
nqs	607/tcp	nqs	
nqs	607/udp	nqs	
mdqs	666/tcp		
mdqs	666/udp		
elcsd	704/tcp	errlog copy/server daemon	
elcsd	704/udp	errlog copy/server daemon	
netcp	740/tcp	NETscout Control Protocol	[AXS2]
netcp	740/udp	NETscout Control Protocol	[AXS2]
netgw	741/tcp	netGW	[OXK]
netgw	741/udp	netGW	[OXK]
netrcs	742/tcp	Network based Rev. Cont. Sys.	[GXC2]
netrcs	742/udp	Network based Rev. Cont. Sys.	[GXC2]
flexlm	744/tcp	Flexible License Manager	[MXC2]
flexlm	744/udp	Flexible License Manager	[MXC2]
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	
hp-collector	781/tcp	hp performance data collector
hp-collector	781/udp	hp performance data collector
hp-managed-node	782/tcp	hp performance data managed node
hp-managed-node	782/udp	hp performance data managed node
hp-alarm-mgr	783/tcp	hp performance data alarm manager
hp-alarm-mgr	783/udp	hp performance data alarm manager
mdbs_daemon	800/tcp	
mdbs_daemon	800/udp	
device	801/tcp	
device	801/udp	
xtreelic	996/tcp	XTREE License Server
xtreelic	996/udp	XTREE License Server
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	

## 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 [45,106] 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 [46,104].

The Registered Ports are in the range 1024-65535.

## Port Assignments:

Keyword	Decimal	Description	References
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blackjack	1025/tcp	network blackjack	
blackjack	1025/udp	network blackjack	
hermes	1248/tcp		
hermes	1248/udp		
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	[SXS4]
sbook	1349/udp	Registration Network Protocol	[SXS4]
editbench	1350/tcp	Registration Network Protocol	[SXS4]
editbench	1350/udp	Registration Network Protocol	[SXS4]
equationbuilder	1351/tcp	Digital Tool Works (MIT)	[TXT1]
equationbuilder	1351/udp	Digital Tool Works (MIT)	[TXT1]
lotusnote	1352/tcp	Lotus Note	[GXP1]
lotusnote	1352/udp	Lotus Note	[GXP1]
ingreslock	1524/tcp	ingres	
ingreslock	1524/udp	ingres	
orasrv	1525/tcp	oracle	
orasrv	1525/udp	oracle	
prospero-np	1525/tcp	prospero non-privileged	
prospero-np	1525/udp	prospero non-privileged	
tlisrv	1527/tcp	oracle	
tlisrv	1527/udp	oracle	
coauthor	1529/tcp	oracle	

coauthor	1529/udp	oracle
issd	1600/tcp	
issd	1600/udp	
nkd	1650/tcp	
nkd	1650/udp	
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	
www-dev	2784/tcp	world wide web - development
www-dev	2784/udp	world wide web - development
NSWS	3049/tcp	

NSWS	3049/ddddp	
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
rmonitor_secure	5145/tcp	
rmonitor_secure	5145/udp	
padl2sim	5236/tcp	
padl2sim	5236/udp	
sub-process	6111/tcp	HP SoftBench Sub-Process Control
sub-process	6111/udp	HP SoftBench Sub-Process Control
xdsxmd	6558/udp	
xdsxmd	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 management server
afs3-volser	7005/udp	volume management 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
man	9535/tcp	
man	9535/udp	
isode-dua	17007/tcp	
isode-dua	17007/udp	

## INTERNET MULTICAST ADDRESSES

Host Extensions for IP Multicasting (RFC-1112) [43] 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	Reserved	[43,JBP]
224.0.0.1	All Systems on this Subnet	[43,JBP]
224.0.0.2	All Routers on this Subnet	[JBP]
224.0.0.3	Unassigned	[JBP]
224.0.0.4	DVMRP Routers	[140,JBP]
224.0.0.5	OSPFIGP OSPFIGP All Routers	[83,JXM1]
224.0.0.6	OSPFIGP OSPFIGP Designated Routers	[83,JXM1]
224.0.0.7	ST Routers	[KS14]
224.0.0.8	ST Hosts	[KS14]
224.0.0.9	RIP2 Routers	[GSM11]
224.0.0.10-224.0.0.255	Unassigned	[JBP]
224.0.1.0	VMTP Managers Group	[17,DRC3]
224.0.1.1	NTP Network Time Protocol	[80,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]
224.0.1.10-224.0.1.255	Unassigned	[JBP]
224.0.2.1	"rwho" Group (BSD) (unofficial)	[JBP]
224.0.2.2	SUN RPC PMAPPROC_CALLIT	[BXE1]
224.0.3.0-224.0.3.255	RFE Generic Service	[DXS3]
224.0.4.0-224.0.4.255	RFE Individual Conferences	[DXS3]
224.1.0.0-224.1.255.255	ST Multicast Groups	[KS14]
224.2.0.0-224.2.255.255	Multimedia Conference Calls	[SC3]
232.x.x.x	VMTP transient groups	[17,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".

## 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 (which is in bit transmission order):

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

## IP TOS PARAMETERS

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

There are four assigned TOS values: low delay, high throughput, high reliability, and low cost; in each case, 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.

## IP TIME TO LIVE PARAMETER

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

## DOMAIN SYSTEM PARAMETERS

The Internet Domain Naming System (DOMAIN) includes several parameters. These are documented in RFC-1034, [81] and RFC-1035 [82]. 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)	[81,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	[82]
NS	2 an authoritative name server	[82]
MD	3 a mail destination (Obsolete - use MX)	[82]
MF	4 a mail forwarder (Obsolete - use MX)	[82]
CNAME	5 the canonical name for an alias	[82]
SOA	6 marks the start of a zone of authority	[82]
MB	7 a mailbox domain name (EXPERIMENTAL)	[82]
MG	8 a mail group member (EXPERIMENTAL)	[82]
MR	9 a mail rename domain name (EXPERIMENTAL)	[82]
NULL	10 a null RR (EXPERIMENTAL)	[82]
WKS	11 a well known service description	[82]
PTR	12 a domain name pointer	[82]
HINFO	13 host information	[82]
MINFO	14 mailbox or mail list information	[82]
MX	15 mail exchange	[82]
TXT	16 text strings	[82]
RP	17 for Responsible Person	[172]
AFSDB	18 for AFS Data Base location	[172]
X25	19 for X.25 PSDN address	[172]
ISDN	20 for ISDN address	[172]
RT	21 for Route Through	[172]

NSAP	22 for NSAP address, NSAP style A record	[174]
NSAP-PTR	23 for domain name pointer, NSAP style	[174]
AXFR	252 transfer of an entire zone	[82]
MAILB	253 mailbox-related RRs (MB, MG or MR)	[82]
MAILA	254 mail agent RRs (Obsolete - see MX)	[82]
*	255 A request for all records	[82]

## BOOTP PARAMETERS

The Bootstrap Protocol (BOOTP) RFC-951 [36] 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 BOOTP Vendor Information Extensions RFC-1084 [117] describes an addition to the Bootstrap Protocol (BOOTP).

Vendor Extensions are listed below:

Tag ---	Name ----	Data Length -----	Meaning -----
0	Pad	0	None
1	Subnet Mask	4	Subnet Mask Value
2	Time Zone	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 checks
14	Merit Dump File		Client to dump and name the file to dump it to
15-127	Unassigned		
128-154	Reserved		
255	End	0	None

## 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) RFC-1157 [15], or the "Common Management Information Protocol over TCP" (CMOT) [142].

The data structure is the "Structure and Identification of Management Information for TCP/IP-based Internets" (SMI) RFC-1155 [120], and the "Management Information Base for Network Management of TCP/IP-based Internets" (MIB-II) [121].

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) RFC-1028 [37] 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.

## SMI Network Management Directory Codes:

Prefix: 1.3.6.1.1.

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

## SMI Network Management MGMT Codes:

Prefix: 1.3.6.1.2.

Decimal -----	Name ----	Description -----	References -----
0	Reserved		[IANA]
1	MIB		[149,KZM]

Prefix: 1.3.6.1.2.1. (mib-2)

Decimal -----	Name ----	Description -----	References -----
0	Reserved	Reserved	[IANA]
1	system	System	[150,KZM]
2	interfaces	Interfaces	[150,KZM]

3	at	Address Translation	[150,KZM]
4	ip	Internet Protocol	[150,KZM]
5	icmp	Internet Control Message	[150,KZM]
6	tcp	Transmission Control Protocol	[150,KZM]
7	udp	User Datagram Protocol	[150,KZM]
8	egp	Exterior Gateway Protocol	[150,KZM]
9	cmot	CMIP over TCP	[150,KZM]
10	transmission	Transmission	[150,KZM]
11	snmp	Simple Network Management	[150,KZM]
12	GenericIF	Generic Interface Extensions	[151,163,KZM]
13	Appletalk	Appletalk Networking	[152, SXW]
14	ospf	Open Shortest Path First	[153, FB77]
15	bgp	Border Gateway Protocol	[154, SW159]
16	rmon	Remote Network Monitoring	[155, SXW]
17	bridge	Bridge Objects	[156, EXD]
18	DecnetP4	Decnet Phase 4	
19	Character	Character Streams	[165, BS221]
20	snmpParties	SNMP Parties	[177, KZM]
21	snmpSecrets	SNMP Secrets	[177, KZM]

Prefix: 1.3.6.1.2.1.10 (transmission)

Decimal	Name	Description	
-----	----	-----	
7	IEEE802.3	CSMACD--like Objects	[157, JXC]
8	IEEE802.4	Token Bus-like Objects	[158, 163, KZM]
9	IEEE802.5	Token Ring-like Objects	[159, 163, KZM]
15	FDDI	FDDI Objects	[160, JDC20]
18	DS1	T1 Carrier Objects	[161, 163, FB77]
30	DS3	DS3 Interface Objects	[162, 163, TXC]
31	SIP	SMDS Interface Objects	[164, TXC]
32	FRAME-RELAY	Frame Relay Objects	[168, CXB]
33	RS-232	RS-232 Objects	[166, BS221]
34	Parallel	Parallel Printer Objects	[167, BS221]

## SMI Network Management Experimental Codes:

Prefix: 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	[TXC]
* 16	SIP	SMDS Interface Protocol	[TXC]
* 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		[TXC]
32	SONET MIB		[TXC]
33	IDENT		[MTR]
34	MIME-MHS		[MTR]

\* = obsoleted

## SMI Network Management Private Enterprise Codes:

Prefix: 1.3.6.1.4.1.

Decimal	Name	References
-----	----	-----
0	Reserved	[JKR1]
1	Proteon	[JS28]
2	IBM	[VXC]
3	CMU	[SXW]
4	Unix	[KXS]
5	ACC	[AB20]
6	TWG	[KZM]
7	CAYMAN	[BP52]
8	PSI	[MS9]
9	cisco	[GXS]
10	NSC	[GS123]
11	HP	[RDXS]
12	Epilogue	[KA4]
13	U of Tennessee	[JDC20]
14	BBN	[RH6]
15	Xylogics, Inc.	[JRL3]
16	Timeplex	[LXB1]
17	Canstar	[SXP]
18	Wellfleet	[JCB1]
19	TRW	[HXL]
20	MIT	[JR35]
21	EON	[MXW]
22	Spartacus	[YXK]
23	Excelan	[RXB]
24	Spider Systems	[VXW]
25	NSFNET	[HWB]
26	Hughes LAN Systems	[KZM]
27	Intergraph	[GS91]
28	Interlan	[BXT]
29	Vitalink Communications	[FXB]
30	Ulane	[BXA]
31	NSWC	[SRN1]
32	Santa Cruz Operation	[KR35]
33	Xyplex	[BXS]
34	Cray	[HXE]
35	Bell Northern Research	[GXW]
36	DEC	[RXB1]
37	Touch	[BXB]
38	Network Research Corp.	[BXV]
39	Baylor College of Medicine	[SB98]
40	NMFECC-LLNL	[SXH]
41	SRI	[DW181]

42	Sun Microsystems	[DXY]
43	3Com	[TB6]
44	CMC	[DXP]
45	SynOptics	[DXP1]
46	Cheyenne Software	[RXH]
47	Prime Computer	[MXS]
48	MCNC/North Carolina Data Network	[KXW]
49	Chipcom	[JXC]
50	Optical Data Systems	[JXF]
51	gated	[JXH]
52	Cabletron Systems	[RXD]
53	Apollo Computers	[JXB]
54	DeskTalk Systems, Inc.	[DXK]
55	SSDS	[RXS]
56	Castle Rock Computing	[JXS1]
57	MIPS Computer Systems	[CXM]
58	TGV, Inc.	[KAA]
59	Silicon Graphics, Inc.	[RXJ]
60	University of British Columbia	[DXM354]
61	Merit	[BXN]
62	FiberCom	[EXR]
63	Apple Computer Inc	[JXH1]
64	Gandalf	[HXK]
65	Dartmouth	[PKX]
66	David Systems	[KXD1]
67	Reuter	[BXZ]
68	Cornell	[DC126]
69	LMS	[MLS34]
70	Locus Computing Corp.	[AXS]
71	NASA	[SS92]
72	Retix	[AXM]
73	Boeing	[JXG]
74	AT&T	[RXB2]
75	Ungermann-Bass	[DXM]
76	Digital Analysis Corp.	[SXK]
77	LAN Manager	[DXK]
78	Netlabs	[JB478]
79	ICL	[JXI]
80	Auspex Systems	[BXE]
81	Lannet Company	[EXR]
82	Network Computing Devices	[DM280]
83	Raycom Systems	[BXW1]
84	Pirelli Focom Ltd.	[SXL]
85	Datability Software Systems	[LXF]
86	Network Application Technology	[YXW]
87	LINK (Lokales Informatik-Netz Karlsruhe)	[GXS]
88	NYU	[BJR2]
89	RND	[RXN]

90	InterCon Systems Corporation	[AW90]
91	LearningTree Systems	[JXG2]
92	Webster Computer Corporation	[RXE]
93	Frontier Technologies Corporation	[PXA]
94	Nokia Data Communications	[DXE]
95	Allen-Bradely Company	[BXK]
96	CERN	[JXR]
97	Sigma Network Systems, Inc.	[KXV]
98	Emerging Technologies, Inc.	[DXB2]
99	SNMP Research	[JDC20]
100	Ohio State University	[SXA1]
101	Ultra Network Technologies	[JXD]
102	Microcom	[AXF]
103	Martin Marietta Astronautic Group	[DR137]
104	Micro Technology	[MXE]
105	Process Software Corporation	[BV15]
106	Data General Corporation	[JXK]
107	Bull Company	[AXB]
108	Emulex Corporation	[JXF1]
109	Warwick University Computing Services	[IXD]
110	Network General Corporation	[JXD1]
111	Oracle	[JPH17]
112	Control Data Corporation	[NXR]
113	Hughes Aircraft Company	[KZM]
114	Synernetics, Inc.	[JXP1]
115	Mitre	[BM60]
116	Hitachi, Ltd.	[HXU]
117	Telebit	[MXL2]
118	Salomon Technology Services	[PXM]
119	NEC Corporation	[YXA]
120	Fibermux	[KH157]
121	FTP Software Inc.	[SXX1]
122	Sony	[TXH]
123	Newbridge Networks Corporation	[JXW]
124	Racal-Milgo Information Systems	[MXR]
125	CR SYSTEMS	[SXS2]
126	DSET Corporation	[DXS]
127	Computone	[BXV]
128	Tektronix, Inc.	[DT167]
129	Interactive Systems Corporation	[SXA2]
130	Banyan Systems Inc.	[DXT]
131	Sintrom Datanet Limited	[SXW]
132	Bell Canada	[MXF]
133	Crosscomm Corporation	[RXS1]
134	Rice University	[CXF]
135	T3Plus Networking, Inc.	[HXF]
136	Concurrent Computer Corporation	[JRL3]
137	Basser	[PXO]

138	Luxcom	[RXB]
139	Artel	[JXZ]
140	Independence Technologies, Inc. (ITI)	[GXB]
141	Frontier Software Development	[NXP]
142	Digital Computer Limited	[OXF]
143	Eyring, Inc.	[RH227]
144	Case Communications	[PXK]
145	Penril DataComm, Inc.	[KXH1]
146	American Airlines	[BXK1]
147	Sequent Computer Systems	[SXH1]
148	Bellcore	[KXT]
149	Konkord Communications	[KXJ]
150	University of Washington	[CXW]
151	Develcon	[SXM]
152	Solarix Systems	[PXA1]
153	Unifi Communications Corp.	[YXH]
154	Roadnet	[DXS]
155	Network Systems Corp.	[NXE]
156	ENE (European Network Engineering)	[PXC]
157	Dansk Data Elektronik A/S	[PXH]
158	Morning Star Technologies	[KXF]
159	Dupont EOP	[OXR]
160	Legato Systems, Inc.	[JXK1]
161	Motorola SPS	[VXE]
162	European Space Agency (ESA)	[EXX]
163	BIM	[BXL2]
164	Rad Data Communications Ltd.	[OXI]
165	Intellicom	[PXS]
166	Shiva Corporation	[NXL]
167	Fujikura America	[DXR]
168	Xlnt Designs INC (XDI)	[MA108]
169	Tandem Computers	[RXD3]
170	BICC	[DXB3]
171	D-Link Systems, Inc.	[HXN]
172	AMP, Inc.	[RXD4]
173	Netlink	[MXZ]
174	C. Itoh Electronics	[LXD1]
175	Sumitomo Electric Industries (SEI)	[KXT1]
176	DHL Systems, Inc.	[DXG2]
177	Network Equipment Technologies	[MXT1]
178	APTEC Computer Systems	[LXB]
179	Schneider & Koch & Co., Datensysteme GmbH	[TXR1]
180	Hill Air Force Base	[RXW]
181	ADC Kentrox	[BXK2]
182	Japan Radio Co.	[NXK]
183	Versitron	[MXH]
184	Telecommunication Systems	[HXL1]
185	Interphase	[GXW1]

186	Toshiba Corporation	[MXA]
187	Clearpoint Research Corp.	[FJK2]
188	Ascom Gfeller Ltd.	[AXS1]
189	Fujitsu America	[CXL]
190	NetCom Solutions, Inc.	[DXC]
191	NCR	[CXK]
192	Dr. Materna GmbH	[TXB]
193	Ericsson Business Communications	[GXN]
194	Metaphor Computer Systems	[PXR]
195	Patriot Partners	[PXR]
196	The Software Group Limited (TSG)	[RP211]
197	Kalpana, Inc.	[AXB3]
198	University of Waterloo	[RXW1]
199	CCL/ITRI	[MXC]
200	Coeur Postel	[PKX2]
201	Mitsubish Cable Industries, Ltd.	[MXH1]
202	SMC	[LXS]
203	Crescendo Communication, Inc.	[PXJ]
204	Goodall Software Engineering	[DG223]
205	Intecom	[BXP]
206	Victoria University of Wellington	[JXS3]
207	Allied Telesis, Inc.	[SXH2]
208	Dowty Network Systems A/S	[HXE1]
209	Protocols	[GXA]
210	Nippon Telegraph and Telephone Corp.	[TXS1]
211	Fujitsu Limited	[IXH]
212	Network Peripherals Inc.	[CXC]
213	Netronix, Inc.	[JXR3]
214	University of Wisconsin - Madison	[DW328]
215	NetWorth, Inc.	[CXS]
216	Tandberg Data A/S	[HXH]
217	Technically Elite Concepts, Inc.	[RXD5]
218	Labtam Australia Pty. Ltd.	[MXP1]
219	Republic Telcom Systems, Inc.	[SXH3]
220	ADI Systems, Inc.	[PXL]
221	Microwave Bypass Systems, Inc.	[TXA]
222	Pyramid Technology Corp.	[RXR]
223	Unisys_Corp	[LXB2]
224	LANOPTICS LTD. Israel	[IXD1]
225	NKK Corporation	[JXY]
226	MTrade UK Ltd.	[PXD]
227	Acals	[PXC1]
228	ASTEC, Inc.	[HXF1]
229	Delmarva Power	[JXS4]
230	Telematics International, Inc.	[KXS1]
231	Siemens Nixdorf Informations Systeme AG	[GXK]
232	Compaq	[SXB]
233	NetManage, Inc.	[WXD]

234	NCSU Computing Center	[DXJ]
235	Empirical Tools and Technologies	[KA4]
236	Samsung Group	[HXP]
237	Takaoka Electric Mfg. Co., Ltd.	[HXX2]
238	Netrix Systems Corporation	[EXM]
239	WINDATA	[BXR]
240	RC International A/S	[CXD1]
241	Netexp Research	[HXB]
242	Internode Systems Pty Ltd	[SXH4]
243	netCS Informationstechnik GmbH	[OXK]
244	Lantronix	[RXL]
245	Avatar Consultants	[KH157]
246	Furukawa Electoric Co. Ltd.	[SXF]
247	AEG Electrcom	[RXN2]
248	Richard Hirschmann GmbH & Co.	[HXX1]
249	G2R Inc.	[KXH]
250	University of Michigan	[TXH1]
251	Netcomm, Ltd.	[WXS2]
252	Sable Technology Corporation	[RXT]
253	Xerox	[EXR3]
254	Conware Computer Consulting GmbH	[MXS2]
255	Compatible Systems Corp.	[JG423]
256	Scitec Communications Systems Ltd.	[SXL1]
257	Transarc Corporation	[PXB]
258	Matsushita Electric Industrial Co., Ltd.	[NXM]
259	ACCTON Technology	[DXR1]
260	Star-Tek, Inc.	[CXM1]
261	Codenoll Tech. Corp.	[DXW]
262	Formation, Inc.	[CXM2]
263	Seiko Instruments, Inc. (SII)	[YXW1]
264	RCE (Reseaux de Communication d'Entreprise S.A.)	[EXB]
265	Xenocom, Inc.	[SXW2]
266	AEG KABEL	[HXT1]
267	Systech Computer Corporation	[BXP1]
268	Visual	[BXO]
269	SDD (Scandinavian Airlines Data Denmark A/S)	[PXF]
270	Zenith Electronics Corporation	[DXL]
271	TELECOM FINLAND	[PXJ1]
272	BinTec Computersystems	[MXS3]
273	EUnet Germany	[MXS4]
274	PictureTel Corporation	[OXJ]
275	Michigan State University	[LXW]
276	GTE Telecom Incorporated	[LXO]
277	Cascade Communications Corp.	[CS1]
278	Hitachi Cable, Ltd.	[TXA1]
279	Olivetti	[MXF1]
280	Vitacom Corporation	[PXR1]
281	INMOS	[GXH]

282	AIC Systems Laboratories Ltd.	[GXM1]
283	Cameo Communications, Inc.	[AXB4]
284	Diab Data AB	[MXL1]
285	Olicom A/S	[LXP]
286	Digital-Kienzle Computersystems	[HXD]
287	CSELT(Centro Studi E Laboratori Telecomunicazioni)	[PXC2]
288	Electronic Data Systems	[MXH2]
289	McData Corporation	[GXL]
290	Harris Computer Systems Division (HCSD)	[DXR2]
291	Technology Dynamics, Inc.	[CXS1]
292	DATAHOUSE Information Systems Ltd.	[KXL]
293	DSIR Network Group	[TXP]
294	Texas Instruments	[BXS1]
295	PlainTree Systems Inc.	[PXC3]
296	Hedemann Software Development	[SXH5]
297	Fuji Xerox Co., Ltd.	[H XK1]
298	Asante Technology	[HXM]
299	Stanford University	[BXM]
300	Digital Link	[JXT1]
301	Raylan Corporation	[MXL2]
302	Datacraft	[AXL]
303	Hughes	[KZM]
304	Farallon Computing, Inc.	[SXS3]
305	GE Information Services	[SXB2]
306	Gambit Computer Communications	[ZXS]
307	Livingston Enterprises, Inc.	[SXW3]
308	Star Technologies	[JXM1]
309	Micronics Computers Inc.	[DXC1]
310	Basis, Inc.	[HXS]
311	Microsoft	[JXB1]
312	US West Advance Technologies	[DXH]
313	University College London	[SXC]
314	Eastman Kodak Company	[WXC1]
315	Network Resources Corporation	[KXW1]
316	Atlas Telecom	[BXK2]
317	Bridgeway	[UXV]
318	American Power Conversion Corp.	[PXY]
319	DOE Atmospheric Radiation Measurement Project	[PKX3]
320	VerSteeg CodeWorks	[BXV]
321	Verilink Corp	[BXV]
322	Sybus Corpotation	[MXB2]
323	Tekelec	[BXG]
324	NASA Ames Research Center	[NXC]
325	Simon Fraser University	[RXU]
326	Fore Systems, Inc.	[EXC1]
327	Centrum Communications, Inc.	[VXL]
328	NeXT Computer, Inc.	[LXL]
329	Netcore, Inc.	[SXM1]

330	Northwest Digital Systems	[BXD]
331	Andrew Corporation	[TXT]
332	DigiBoard	[DXK2]
333	Computer Network Technology Corp.	[BXM1]
334	Lotus Development Corp.	[BXF1]
335	MICOM Communication Corporation	[DXB4]
336	ASCII Corporation	[TXO]
337	PUREDATA Research/USA	[BXF2]
338	NTT DATA	[YXK1]
339	Empros Systems International	[DXT1]
340	Kendall Square Research (KSR)	[DXH1]
341	Martin Marietta Energy Systems	[GXH1]
342	Network Innovations	[PXG]
343	Intel Corporation	[CXT1]
344	Proxar	[CXH]
345	Epson Research Center	[RXS2]
346	Fibernet	[GXS1]
347	Box Hill Systems Corporation	[TXJ]
348	American Express Travel Related Services	[JXC1]
349	Compu-Shack	[TXV]
350	Parallan Computer, Inc.	[CXD2]
351	Stratacom	[CXI]
352	Open Networks Engineering, Inc.	[RXB4]
353	ATM Forum	[KZM]
354	SSD Management, Inc.	[BXR1]
355	Automated Network Management, Inc.	[CXV]
356	Magnalink Communications Corporation	[DXK3]
357	TIL Systems, Ltd.	[GXM2]
358	Skyline Technology, Inc.	[DXW1]
359	Nu-Mega Technologies, Inc.	[DXS4]
360	Morgan Stanley & Co. Inc.	[VXK]
361	Integrated Business Network	[MXB3]
362	L & N Technologies, Ltd.	[SXL2]
363	Cincinnati Bell Information Systems, Inc.	[DXM4]
364	OSCOM International	[FXF]
365	MICROGNOSIS	[PXA2]
366	Datapoint Corporation	[LZ15]
367	RICOH Co. Ltd.	[TXW]
368	Axis Communications AB	[MG277]
369	Pacer Software	[WXT]
370	Axon Networks Inc.	[RXI]
371	Brixton Systems, Inc.	[PXE]
372	GSI	[PXB1]
373	Tatung Co., Ltd.	[CXC1]
374	DIS Research LTD	[RXC2]
375	Quotron Systems, Inc.	[RXS3]
376	Dassault Electronique	[OXC]
377	Corollary, Inc.	[JXG3]

378	SEEL, Ltd.	[KXR]
379	Lexcel	[MXE]
380	W.J. Parducci & Associates, Inc.	[WXP]
381	OST	[AXP1]
382	Megadata Pty Ltd.	[AXM2]
383	LLNL Livermore Computer Center	[DXN]
384	Dynatech Communications	[GXW2]
385	Symplex Communications Corp.	[CXA]
386	Tribe Computer Works	[KXF1]
387	Taligent, Inc.	[LXA]
388	Symbol Technology, Inc.	[JXC2]
389	Lancert	[MXH3]
390	Alantec	[PXV]
391	Ridgeback Solutions	[EXG]
392	Metrix, Inc.	[DXV]
393	Excutive Systems/XTree Company	[DXC2]
394	NRL Communication Systems Branch	[RXR1]
395	I.D.E. Corporation	[RXS4]
396	Matsushita Electric Works, Ltd.	[CXH1]
397	MegaPAC	[IXG]
398	Pilkingon Communication Systems	[DXA]
440	Amnet, Inc.	[RM1]
441	Chase Research	[KXG]
442	PEER Networks	[TS566]
443	Gateway Communications, Inc.	[EXF]
444	Peregrine Systems	[EXO]
445	Daewoo Telecom	[SXO]
446	Norwegian Telecom Research	[PXY1]
447	WilTel	[AXP]
448	Ericsson-Camtec	[SXP1]
449	Codex	[TXM1]
450	Basis	[HXS]
451	AGE Logic	[SXL3]
452	INDE Electronics	[GXD1]
453	ISODE Consortium	[SH284]
454	J.I. Case	[MXO1]
455	Trillium Digital Systems	[CXC2]
456	Bacchus Inc.	[EXG]
457	MCC	[DR48]
458	Stratus Computer	[KXC]
459	Quotron	[RXS3]
460	Beame & Whiteside	[CXB1]
461	Cellular Technical Servuces	[GXH2]

SGMP Vendor Specific Codes: [obsolete]

Prefix: 1,255,

Decimal	Name	References
-----	----	-----
0	Reserved	[JKR1]
1	Proteon	[JS18]
2	IBM	[JXR]
3	CMU	[SXW]
4	Unix	[MS9]
5	ACC	[AB20]
6	TWG	[MTR]
7	CAYMAN	[BP52]
8	NYSERNET	[MS9]
9	cisco	[GS2]
10	BBN	[RH6]
11	Unassigned	[JKR1]
12	MIT	[JR35]
13-254	Unassigned	[JKR1]
255	Reserved	[JKR1]

## MILNET LOGICAL ADDRESSES

The MILNET facility for "logical addressing" is described in RFC-878 [57] and RFC-1005 [109]. 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 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 [2].

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 RFTM 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	[133,XEROX]
151	Unassigned	[JBP]
152	PARC Universal Protocol	[8,XEROX]
153	TIP Status Reporting	[JGH]
154	TIP Accounting	[JGH]
155	Internet Protocol [regular]	[105,JBP]
156-158	Internet Protocol [experimental]	[105,JBP]
159	Fingleaf Link	[JBW1]
160	Blacker Local Network Protocol	[DM28]
161-194	Unassigned	[JBP]
195	ISO-IP	[64,RXM]
196-247	Experimental Protocols	[JBP]
248-255	Network Maintenance	[JGH]

## 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.

## 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)	[104,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	[64,JXJ]
11111111	11111111	255	Global DSAP	[IEEE]

These numbers (and others) are assigned by the IEEE Standards Office. The address is: IEEE Standards Office, 345 East 47th Street, New York, N.Y. 10017, Attn: Vince Condello. Phone: (212) 705-7092.

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 RFC-1042 [90]).

## ETHERNET NUMBERS OF INTEREST

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 Ethernet type, contact the Xerox Corporation, Xerox Systems Institute, 475 Oakmead Parkway, Sunnyvale, CA 94086, Attn: Ms. Fonda Pallone, (415) 813-7164.

The following list 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]
1536	0600	1536	3000	XEROX NS IDP	[133,XEROX]
2048	0800	513	1001	DOD IP	[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	8065-8066	-	-	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]
32966	80C6	-	-	Pacer Software	[XEROX]
32967	80C7	-	-	Applitek Corporation	[XEROX]
32968	80C8-80CC	-	-	Intergraph Corporation	[XEROX]
32973	80CD-80CE	-	-	Harris Corporation	[XEROX]
32974	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	-	-	Waterloo Microsystems	[XEROX]
33073	8131	-	-	VG Laboratory Systems	[XEROX]
33079	8137-8138	-	-	Novell, Inc.	[XEROX]
33081	8139-813D	-	-	KTI	[XEROX]
33100	814C	-	-	SNMP	[JKR1]
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]

The standard for transmission of IP datagrams over Ethernets and Experimental Ethernets is specified in RFC-894 [61] and RFC-895 [91] respectively.

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

IEEE Standards Office, 345 East 47th Street, New York, N.Y. 10017,  
Attn: Vince Condello. Phone: (212) 705-7092.

## 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
00000F	NeXT
000010	Sytek
00001D	Cabletron
000020	DIAB (Data Intdustriier AB)
000022	Visual Technology
00002A	TRW
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	
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)
001700	Kabel	
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	Excelan	
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

Ethernet Address	Type Field	Usage
Multicast Addresses:		
01-00-5E-00-00-00- 01-00-5E-7F-FF-FF	0800	Internet Multicast (RFC-1112) [43]
01-00-5E-80-00-00- 01-00-5E-FF-FF-FF	????	Internet reserved by IANA
01-80-C2-00-00-00	-802-	Spanning tree (for bridges)
09-00-02-04-00-01?	8080?	Vitalink printer
09-00-02-04-00-02?	8080?	Vitalink management
09-00-09-00-00-01	8005	HP Probe
09-00-09-00-00-01	-802-	HP Probe
09-00-09-00-00-04	8005?	HP DTC
09-00-1E-00-00-00	8019?	Apollo DOMAIN
09-00-2B-00-00-00	6009?	DEC MUMPS?
09-00-2B-00-00-01	8039?	DEC DSM/DTP?
09-00-2B-00-00-02	803B?	DEC VAXELN?
09-00-2B-00-00-03	8038	DEC Lanbridge Traffic Monitor (LTM)
09-00-2B-00-00-04	????	DEC MAP End System Hello
09-00-2B-00-00-05	????	DEC MAP Intermediate System Hello
09-00-2B-00-00-06	803D?	DEC CSMA/CD Encryption?
09-00-2B-00-00-07	8040?	DEC NetBios Emulator?
09-00-2B-00-00-0F	6004	DEC Local Area Transport (LAT)
09-00-2B-00-00-1x	????	DEC Experimental
09-00-2B-01-00-00	8038	DEC LanBridge Copy packets (All bridges)
09-00-2B-01-00-01	8038	DEC LanBridge Hello packets (All local bridges) 1 packet per second, sent by the designated LanBridge
09-00-2B-02-00-00	????	DEC DNA Lev. 2 Routing Layer routers?
09-00-2B-02-01-00	803C?	DEC DNA Naming Service Advertisement?
09-00-2B-02-01-01	803C?	DEC DNA Naming Service Solicitation?
09-00-2B-02-01-02	803E?	DEC DNA Time Service?
09-00-2B-03-xx-xx	????	DEC default filtering by bridges?
09-00-2B-04-00-00	8041?	DEC Local Area Sys. Transport (LAST)?
09-00-2B-23-00-00	803A?	DEC Argonaut Console?
09-00-4E-00-00-02?	8137?	Novell IPX
09-00-56-00-00-00- 09-00-56-FE-FF-FF	????	Stanford reserved
09-00-56-FF-00-00- 09-00-56-FF-FF-FF	805C	Stanford V Kernel, version 6.0
09-00-77-00-00-01	????	Retix spanning tree bridges
09-00-7C-02-00-05	8080?	Vitalink diagnostics

09-00-7C-05-00-01	8080?	Vitalink gateway?
0D-1E-15-BA-DD-06	????	HP
AB-00-00-01-00-00	6001	DEC Maintenance Operation Protocol (MOP) Dump/Load Assistance
AB-00-00-02-00-00	6002	DEC Maintenance Operation Protocol (MOP) Remote Console 1 System ID packet every 8-10 minutes, by every: DEC LanBridge DEC DEUNA interface DEC DELUA interface DEC DEQNA interface (in a certain mode)
AB-00-00-03-00-00	6003	DECNET Phase IV end node Hello packets 1 packet every 15 seconds, sent by each DECNET host
AB-00-00-04-00-00	6003	DECNET Phase IV Router Hello packets 1 packet every 15 seconds, sent by the DECNET router
AB-00-00-05-00-00	????	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

## 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

## PROTOCOL/TYPE FIELD ASSIGNMENTS

Below are two tables describing the arrangement of protocol fields or type field assignments so that one could send NS 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.

lower \ upper	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
-----	-----	-----	-----

lower \ upper	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
-----	-----	-----	-----

## 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,<br>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,<br>new XOR checksum) |

## 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 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 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)
00ff	reserved (compression inefficient)
0201	802.1d Hello Packets
0231	Luxcom
0233	Sigma Network Systems
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
80ff	reserved (compression inefficient)

c021	Link Control Protocol
c023	Password Authentication Protocol
c025	Link Quality Report
c223	Challenge Handshake Authentication Protocol

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

It is recommended that values in the "02--" to "1e--" and "--01" to "--1f" ranges not be assigned, as they are compression inefficient.

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

Protocol field values in the "c---" to "e---" 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] and Internet Protocol Control Protocol (IPCP) [147] 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	* RESERVED

\* LCP 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

## 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 BRIDGING CONFIGURATION OPTION TYPES

The Point-to-Point Protocol (PPP) Extensions for Bridging specifies a number of Configuration Options [176] which are distinguished by an 8 bit Type field. These Types are assigned as follows:

Type	Configuration Option
----	-----
1	Remote Ring Identification
2	Line Identification
3	MAC Type Selection
4	Tinygram Compression
5	LAN Identification

## PPP BRIDGING MAC TYPES

The Point-to-Point Protocol (PPP) Extensions for Bridging [176] 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
2	IEEE 802.4
3	IEEE 802.5
4	FDDI

## ADDRESS RESOLUTION PROTOCOL PARAMETERS

The Address Resolution Protocol (ARP) specified in RFC-826 [88] has several parameters. The assigned values for these parameters are listed here.

## Assignments:

## Operation Code (op)

- 1 REQUEST
- 2 REPLY

## Hardware Type (hrd)

Type	Description	References
----	-----	-----
1	Ethernet (10Mb)	[JBP]
2	Experimental Ethernet (3Mb)	[JBP]
3	Amateur Radio AX.25	[PXX]
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]

## 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).

## REVERSE ADDRESS RESOLUTION PROTOCOL OPERATION CODES

The Reverse Address Resolution Protocol (RARP) specified in RFC-903 [48] has the following operation codes:

Assignments:

Operation Code (op)

- 3 request Reverse
- 4 reply Reverse

## DYNAMIC REVERSE ARP

Assignments:

Operation Code (op)

- 5 DRARP-Request
- 6 DRARP-Reply
- 7 DRARP-Error

For further information, contact: David Brownell  
(suneast!helium!db@Sun.COM).

## INVERSE ADDRESS RESOLUTION PROTOCOL

The Inverse Address Resolution Protocol (IARP) specified in RFC-1293 [173] has the following operation codes:

Assignments:

Operation Code (op)

- 8 InARP-Request
- 9 InARP-Reply

## 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	[69,AGM]*
CD	ISO-IP	[AGM]
DD	Network Monitoring	[AGM]

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

## 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]
014.000.000.094-014.255.255.254			Unassigned	[JBP]
014.255.255.255			Reserved	[JBP]

The standard for transmission of IP datagrams over the Public Data Network is specified in RFC-877 [69].

## TELNET OPTIONS

The Telnet Protocol has a number of options that may be negotiated. These options are listed here. "IAB Official Protocol Standards" [62] provides more detailed information.

Options	Name	References
0	Binary Transmission	[110,JBP]
1	Echo	[111,JBP]
2	Reconnection	[42,JBP]
3	Suppress Go Ahead	[114,JBP]
4	Approx Message Size Negotiation	[133,JBP]
5	Status	[113,JBP]
6	Timing Mark	[115,JBP]
7	Remote Controlled Trans and Echo	[107,JBP]
8	Output Line Width	[40,JBP]
9	Output Page Size	[41,JBP]
10	Output Carriage-Return Disposition	[28,JBP]
11	Output Horizontal Tab Stops	[32,JBP]
12	Output Horizontal Tab Disposition	[31,JBP]
13	Output Formfeed Disposition	[29,JBP]
14	Output Vertical Tabstops	[34,JBP]
15	Output Vertical Tab Disposition	[33,JBP]
16	Output Linefeed Disposition	[30,JBP]
17	Extended ASCII	[136,JBP]
18	Logout	[25,MRC]
19	Byte Macro	[35,JBP]
20	Data Entry Terminal	[145,38,JBP]
22	SUPDUP	[26,27,MRC]
22	SUPDUP Output	[51,MRC]
23	Send Location	[68,EAK1]
24	Terminal Type	[128,MS56]
25	End of Record	[103,JBP]
26	TACACS User Identification	[1,BA4]
27	Output Marking	[125,SXS]
28	Terminal Location Number	[84,RN6]
29	Telnet 3270 Regime	[116,JXR]
30	X.3 PAD	[70,SL70]
31	Negotiate About Window Size	[139,DW183]
32	Terminal Speed	[57,CLH3]
33	Remote Flow Control	[58,CLH3]
34	Linemode	[9,DB14]
35	X Display Location	[75,GM23]
36	Environment Option	[DB14]
37	Authentication Option	[DB14]
38	Encryption Option	[DB14]
255	Extended-Options-List	[109,JBP]

## MAIL ENCRYPTION TYPES

RFC-822 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 [71,72,66].

## MIME TYPES

RFC-1341 [169] 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 richtext		[169,NSB]
multipart	mixed alternative digest parallel		[169,NSB]
message	rfc822 partial external-body		[169,NSB]
application	octet-stream postscript oda		[169,NSB]
image	jpeg gif		[169,NSB]
audio	basic		[169,NSB]
video	mpeg		[169,NSB]

## Character Sets

-----

Type ----	Description -----	Reference -----
US-ASCII	the default character set	[169,NSB]
ISO-8859-1	see ISO_8859-1:1987 below	[169,NSB]
ISO-8859-2	see ISO_8859-2:1987 below	[169,NSB]
ISO-8859-3	see ISO_8859-3:1988 below	[169,NSB]
ISO-8859-4	see ISO_8859-4:1988 below	[169,NSB]
ISO-8859-5	see ISO_8859-5:1988 below	[169,NSB]
ISO-8859-6	see ISO_8859-6:1987 below	[169,NSB]
ISO-8859-7	see ISO_8859-7:1987 below	[169,NSB]

ISO-8859-8      see ISO\_8859-8:1988 below  
ISO-8859-9      see ISO\_8859-9:1989 below

[169,NSB]  
[169,NSB]

#### Access Types

-----

Type	Description	Reference
----	-----	-----
FTP		[169,NSB]
ANON-FTP		[169,NSB]
TFTP		[169,NSB]
AFS		[169,NSB]
LOCAL-FILE		[169,NSB]
MAIL-SERVER		[169,NSB]

#### Conversion Values

-----

Conversion values or Content Transfer Encodings.

Type	Description	Reference
----	-----	-----
7BIT		[169,NSB]
8BIT		[169,NSB]
BASE64		[169,NSB]
BINARY		[169,NSB]
QUOTED-PRINTABLE		[169,NSB]

## CHARACTER SETS

Character Set	Reference
-----	-----
ISO_646.basic:1983	[170,KXS2]
INVARIANT	[170,KXS2]
ISO_646.irv:1983	[170,KXS2]
BS_4730	[170,KXS2]
ANSI_X3.4-1968	[170,KXS2]
NATS-SEFI	[170,KXS2]
NATS-SEFI-ADD	[170,KXS2]
NATS-DANO	[170,KXS2]
NATS-DANO-ADD	[170,KXS2]
SEN_850200_B	[170,KXS2]
SEN_850200_C	[170,KXS2]
JIS_C6220-1969-jp	[170,KXS2]
JIS_C6220-1969-ro	[170,KXS2]
IT	[170,KXS2]
PT	[170,KXS2]
ES	[170,KXS2]
greek7-old	[170,KXS2]
latin-greek	[170,KXS2]
DIN_66003	[170,KXS2]
NF_Z_62-010_(1973)	[170,KXS2]
Latin-greek-1	[170,KXS2]
ISO_5427	[170,KXS2]
JIS_C6226-1978	[170,KXS2]
BS_viewdata	[170,KXS2]
INIS	[170,KXS2]
INIS-8	[170,KXS2]
INIS-cyrillic	[170,KXS2]
ISO_5427:1981	[170,KXS2]
ISO_5428:1980	[170,KXS2]
GB_1988-80	[170,KXS2]
GB_2312-80	[170,KXS2]
NS_4551-1	[170,KXS2]
NS_4551-2	[170,KXS2]
NF_Z_62-010	[170,KXS2]
videotex-suppl	[170,KXS2]
PT2	[170,KXS2]
ES2	[170,KXS2]
MSZ_7795.3	[170,KXS2]
JIS_C6226-1983	[170,KXS2]
greek7	[170,KXS2]
ASMO_449	[170,KXS2]
iso-ir-90	[170,KXS2]
JIS_C6229-1984-a	[170,KXS2]
JIS_C6229-1984-b	[170,KXS2]

JIS_C6229-1984-b-add	[170,KXS2]
JIS_C6229-1984-hand	[170,KXS2]
JIS_C6229-1984-hand-add	[170,KXS2]
JIS_C6229-1984-kana	[170,KXS2]
ISO_2033-1983	[170,KXS2]
ANSI_X3.110-1983	[170,KXS2]
ISO_8859-1:1987	[170,KXS2]
ISO_8859-2:1987	[170,KXS2]
T.61-7bit	[170,KXS2]
T.61-8bit	[170,KXS2]
ISO_8859-3:1988	[170,KXS2]
ISO_8859-4:1988	[170,KXS2]
ECMA-cyrillic	[170,KXS2]
CSA_Z243.4-1985-1	[170,KXS2]
CSA_Z243.4-1985-2	[170,KXS2]
CSA_Z243.4-1985-gr	[170,KXS2]
ISO_8859-7:1987	[170,KXS2]
ISO_8859-6:1987	[170,KXS2]
T.101-G2	[170,KXS2]
ISO_8859-8:1988	[170,KXS2]
CSN_369103	[170,KXS2]
JUS_I.B1.002	[170,KXS2]
ISO_6937-2-add	[170,KXS2]
IEC_P27-1	[170,KXS2]
ISO_8859-5:1988	[170,KXS2]
JUS_I.B1.003-serb	[170,KXS2]
JUS_I.B1.003-mac	[170,KXS2]
ISO_8859-9:1989	[170,KXS2]
KS_C_5601-1987	[170,KXS2]
greek-ccitt	[170,KXS2]
NC_NC00-10:81	[170,KXS2]
ISO_6937-2-25	[170,KXS2]
GOST_19768-74	[170,KXS2]
ISO_8859-supp	[170,KXS2]
ISO_10367-box	[170,KXS2]
latin6	[170,KXS2]
latin-lap	[170,KXS2]
JIS_X0212-1990	[170,KXS2]
DS_2089	[170,KXS2]
us-dk	[170,KXS2]
dk-us	[170,KXS2]
JIS_X0201	[170,KXS2]
KSC5636	[170,KXS2]
DEC-MCS	[170,KXS2]
hp-roman8	[170,KXS2]
macintosh	[170,KXS2]
IBM037	[170,KXS2]
IBM038	[170,KXS2]

IBM273	[170,KXS2]
IBM274	[170,KXS2]
IBM275	[170,KXS2]
IBM277	[170,KXS2]
IBM278	[170,KXS2]
IBM280	[170,KXS2]
IBM281	[170,KXS2]
IBM284	[170,KXS2]
IBM285	[170,KXS2]
IBM290	[170,KXS2]
IBM297	[170,KXS2]
IBM420	[170,KXS2]
IBM423	[170,KXS2]
IBM424	[170,KXS2]
IBM437	[170,KXS2]
IBM500	[170,KXS2]
IBM850	[170,KXS2]
IBM851	[170,KXS2]
IBM852	[170,KXS2]
IBM855	[170,KXS2]
IBM857	[170,KXS2]
IBM860	[170,KXS2]
IBM861	[170,KXS2]
IBM862	[170,KXS2]
IBM863	[170,KXS2]
IBM864	[170,KXS2]
IBM865	[170,KXS2]
IBM868	[170,KXS2]
IBM869	[170,KXS2]
IBM870	[170,KXS2]
IBM871	[170,KXS2]
IBM880	[170,KXS2]
IBM891	[170,KXS2]
IBM903	[170,KXS2]
IBM904	[170,KXS2]
IBM905	[170,KXS2]
IBM918	[170,KXS2]
IBM1026	[170,KXS2]
EBCDIC-AT-DE	[170,KXS2]
EBCDIC-AT-DE-A	[170,KXS2]
EBCDIC-CA-FR	[170,KXS2]
EBCDIC-DK-NO	[170,KXS2]
EBCDIC-DK-NO-A	[170,KXS2]
EBCDIC-FI-SE	[170,KXS2]
EBCDIC-FI-SE-A	[170,KXS2]
EBCDIC-FR	[170,KXS2]
EBCDIC-IT	[170,KXS2]
EBCDIC-PT	[170,KXS2]

EBCDIC-ES	[170,KXS2]
EBCDIC-ES-A	[170,KXS2]
EBCDIC-ES-S	[170,KXS2]
EBCDIC-UK	[170,KXS2]
EBCDIC-US	[170,KXS2]

## 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 RFC-952 [53].

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.

ALTO	DEC-1080
ALTOS-6800	DEC-1090
AMDAHL-V7	DEC-1090B
APOLLO	DEC-1090T
ATARI-104ST	DEC-2020T
ATT-3B1	DEC-2040
ATT-3B2	DEC-2040T
ATT-3B20	DEC-2050T
ATT-7300	DEC-2060
BBN-C/60	DEC-2060T
BURROUGHS-B/29	DEC-2065
BURROUGHS-B/4800	DEC-FALCON
BUTTERFLY	DEC-KS10
C/30	DEC-VAX-11730
C/70	DORADO
CADLINC	DPS8/70M
CADR	ELXSI-6400
CDC-170	EVEREX-386
CDC-170/750	FOONLY-F2
CDC-173	FOONLY-F3
CELERITY-1200	FOONLY-F4
CLUB-386	GOULD
COMPAQ-386/20	GOULD-6050
COMTEN-3690	GOULD-6080
CP8040	GOULD-9050
CRAY-1	GOULD-9080
CRAY-X/MP	H-316
CRAY-2	H-60/68
CTIWS-117	H-68
DANDELION	H-68/80
DEC-10	H-89
DEC-1050	HONEYWELL-DPS-6
DEC-1077	HONEYWELL-DPS-8/70

HP3000	ONYX-Z8000
HP3000/64	PDP-11
IBM-158	PDP-11/3
IBM-360/67	PDP-11/23
IBM-370/3033	PDP-11/24
IBM-3081	PDP-11/34
IBM-3084QX	PDP-11/40
IBM-3101	PDP-11/44
IBM-4331	PDP-11/45
IBM-4341	PDP-11/50
IBM-4361	PDP-11/70
IBM-4381	PDP-11/73
IBM-4956	PE-7/32
IBM-6152	PE-3205
IBM-PC	PERQ
IBM-PC/AT	PLEXUS-P/60
IBM-PC/RT	PLI
IBM-PC/XT	PLURIBUS
IBM-SERIES/1	PRIME-2350
IMAGEN	PRIME-2450
IMAGEN-8/300	PRIME-2755
IMSAI	PRIME-9655
INTEGRATED-SOLUTIONS	PRIME-9755
INTEGRATED-SOLUTIONS-68K	PRIME-9955II
INTEGRATED-SOLUTIONS-CREATOR	PRIME-2250
INTEGRATED-SOLUTIONS-CREATOR-8	PRIME-2655
INTEL-386	PRIME-9955
INTEL-IPSC	PRIME-9950
IS-1	PRIME-9650
IS-68010	PRIME-9750
LMI	PRIME-2250
LSI-11	PRIME-750
LSI-11/2	PRIME-850
LSI-11/23	PRIME-550II
LSI-11/73	PYRAMID-90
M68000	PYRAMID-90MX
MAC-II	PYRAMID-90X
MASSCOMP	RIDGE
MC500	RIDGE-32
MC68000	RIDGE-32C
MICROPORT	ROLM-1666
MICROVAX	S1-MKIIA
MICROVAX-I	SMI
MV/8000	SEQUENT-BALANCE-8000
NAS3-5	SIEMENS
NCR-COMTEN-3690	SILICON-GRAPHICS
NEXT/N1000-316	SILICON-GRAPHICS-IRIS
NOW	SGI-IRIS-2400

SGI-IRIS-2500	SUN-3/50
SGI-IRIS-3010	SUN-3/60
SGI-IRIS-3020	SUN-3/75
SGI-IRIS-3030	SUN-3/80
SGI-IRIS-3110	SUN-3/110
SGI-IRIS-3115	SUN-3/140
SGI-IRIS-3120	SUN-3/150
SGI-IRIS-3130	SUN-3/160
SGI-IRIS-4D/20	SUN-3/180
SGI-IRIS-4D/20G	SUN-3/200
SGI-IRIS-4D/25	SUN-3/260
SGI-IRIS-4D/25G	SUN-3/280
SGI-IRIS-4D/25S	SUN-3/470
SGI-IRIS-4D/50	SUN-3/480
SGI-IRIS-4D/50G	SUN-4/60
SGI-IRIS-4D/50GT	SUN-4/110
SGI-IRIS-4D/60	SUN-4/150
SGI-IRIS-4D/60G	SUN-4/200
SGI-IRIS-4D/60T	SUN-4/260
SGI-IRIS-4D/60GT	SUN-4/280
SGI-IRIS-4D/70	SUN-4/330
SGI-IRIS-4D/70G	SUN-4/370
SGI-IRIS-4D/70GT	SUN-4/390
SGI-IRIS-4D/80GT	SUN-50
SGI-IRIS-4D/80S	SUN-100
SGI-IRIS-4D/120GTX	SUN-120
SGI-IRIS-4D/120S	SUN-130
SGI-IRIS-4D/210GTX	SUN-150
SGI-IRIS-4D/210S	SUN-170
SGI-IRIS-4D/220GTX	SUN-386i/250
SGI-IRIS-4D/220S	SUN-68000
SGI-IRIS-4D/240GTX	SYMBOLICS-3600
SGI-IRIS-4D/240S	SYMBOLICS-3670
SGI-IRIS-4D/280GTX	SYMMETRIC-375
SGI-IRIS-4D/280S	SYMULT
SGI-IRIS-CS/12	TANDEM-TXP
SGI-IRIS-4SERVER-8	TANDY-6000
SPERRY-DCP/10	TEK-6130
SUN	TI-EXPLORER
SUN-2	TP-4000
SUN-2/50	TRS-80
SUN-2/100	UNIVAC-1100
SUN-2/120	UNIVAC-1100/60
SUN-2/130	UNIVAC-1100/62
SUN-2/140	UNIVAC-1100/63
SUN-2/150	UNIVAC-1100/64
SUN-2/160	UNIVAC-1100/70
SUN-2/170	UNIVAC-1160

UNKNOWN  
VAX-11/725  
VAX-11/730  
VAX-11/750  
VAX-11/780  
VAX-11/785  
VAX-11/790  
VAX-11/8600  
VAX-8600  
WANG-PC002  
WANG-VS100  
WANG-VS400  
WYSE-386  
XEROX-1108  
XEROX-8010  
ZENITH-148

## 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 RFC-952 [53].

A system name may be up to 40 characters taken from the set of upper-case 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	LISP	SUN OS 3.5
APOLLO	LISPM	SUN OS 4.0
AIX/370	LOCUS	SWIFT
AIX-PS/2	MACOS	TAC
BS-2000	MINOS	TANDEM
CEDAR	MOS	TENEX
CGW	MPE5	TOPS10
CHORUS	MSDOS	TOPS20
CHRYSALIS	MULTICS	TOS
CMOS	MUSIC	TP3010
CMS	MUSIC/SP	TRSDOS
COS	MVS	ULTRIX
CPIX	MVS/SP	UNIX
CTOS	NEXUS	UNIX-BSD
CTSS	NMS	UNIX-V1AT
DCN	NONSTOP	UNIX-V
DDNOS	NOS-2	UNIX-V.1
DOMAIN	NTOS	UNIX-V.2
DOS	OS/DDP	UNIX-V.3
EDX	OS/2	UNIX-PC
ELF	OS4	UNKNOWN
EMBOS	OS86	UT2D
EMMOS	OSX	V
EPOS	PCDOS	VM
FOONEX	PERQ/OS	VM/370
FUZZ	PLI	VM/CMS
GCOS	PSDOS/MIT	VM/SP
GPOS	PRIMOS	VMS
HDOS	RMX/RDOS	VMS/EUNICE
IMAGEN	ROS	VRTX
INTERCOM	RSX11M	WAIT5
IMPRESS	RTE-A	WANG
INTERLISP	SATOPS	WIN32
IOS	SCO-XENIX/386	X11R3
IRIX	SCS	XDE
ISI-68020	SIMP	XENIX
ITS	SUN	

## 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 RFC-952 [53].

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 SYSMANT
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
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

## TERMINAL TYPE NAMES

These are the Official Terminal Type Names. Their use is described in RFC-930 [128]. The maximum length of a name is 40 characters.

A terminal names may be up to 40 characters taken from the set of upper-case 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	DATAMEDIA-1521
ADDS-REGENT-100	DATAMEDIA-2500
ADDS-REGENT-20	DATAMEDIA-3025
ADDS-REGENT-200	DATAMEDIA-3025A
ADDS-REGENT-25	DATAMEDIA-3045
ADDS-REGENT-40	DATAMEDIA-3045A
ADDS-REGENT-60	DATAMEDIA-DT80/1
ADDS-VIEWPOINT	DATAPOINT-2200
ADDS-VIEWPOINT-60	DATAPOINT-3000
AED-512	DATAPOINT-3300
AMPEX-DIALOGUE-210	DATAPOINT-3360
AMPEX-DIALOGUE-80	DEC-DECWRITER-I
AMPEX-210	DEC-DECWRITER-II
AMPEX-230	DEC-GIGI
ANDERSON-JACOBSON-510	DEC-GT40
ANDERSON-JACOBSON-630	DEC-GT40A
ANDERSON-JACOBSON-832	DEC-GT42
ANDERSON-JACOBSON-841	DEC-LA120
ANN-ARBOR-AMBASSADOR	DEC-LA30
ANSI	DEC-LA36
ARDS	DEC-LA38
BITGRAPH	DEC-VT05
BUSSIPLEXER	DEC-VT100
CALCOMP-565	DEC-VT101
CDC-456	DEC-VT102
CDI-1030	DEC-VT125
CDI-1203	DEC-VT131
C-ITOH-101	DEC-VT132
C-ITOH-50	DEC-VT200
C-ITOH-80	DEC-VT220
CLNZ	DEC-VT240
COMPUCOLOR-II	DEC-VT241
CONCEPT-100	DEC-VT300
CONCEPT-104	DEC-VT320
CONCEPT-108	DEC-VT340
DATA-100	DEC-VT50
DATA-GENERAL-6053	DEC-VT50H
DATAGRAPHIX-132A	DEC-VT52
DATAMEDIA-1520	DEC-VT55

DEC-VT61	HP-2626
DEC-VT62	HP-2626A
DELTA-DATA-5000	HP-2626P
DELTA-DATA-NIH-7000	HP-2627
DELTA-TELTERM-2	HP-2640
DIABLO-1620	HP-2640A
DIABLO-1640	HP-2640B
DIGILOG-333	HP-2645
DTC-300S	HP-2645A
DTC-382	HP-2648
EDT-1200	HP-2648A
EXECUPORT-4000	HP-2649
EXECUPORT-4080	HP-2649A
FACIT-TWIST-4440	IBM-1050
FREEDOM-100	IBM-2741
FREEDOM-110	IBM-3101
FREEDOM-200	IBM-3101-10
GENERAL-TERMINAL-100A	IBM-3151
GENERAL-TERMINAL-101	IBM-3179-2
GIPSI-TX-M	IBM-3180-2
GIPSI-TX-ME	IBM-3196-A1
GIPSI-TX-C4	IBM-3275-2
GIPSI-TX-C8	IBM-3276-2
GSI	IBM-3276-3
HAZELTINE-1420	IBM-3276-4
HAZELTINE-1500	IBM-3277-2
HAZELTINE-1510	IBM-3278-2
HAZELTINE-1520	IBM-3278-3
HAZELTINE-1552	IBM-3278-4
HAZELTINE-2000	IBM-3278-5
HAZELTINE-ESPRIT	IBM-3279-2
HITACHI-5601	IBM-3279-3
HITACHI-5603	IBM-3477-FC
HITACHI-5603E	IBM-3477-FG
HITACHI-5603EA	IBM-5081
HITACHI-560X	IBM-5151
HITACHI-560XE	IBM-5154
HITACHI-560XEA	IBM-5251-11
HITACHI-560PR	IBM-5291-1
HITACHI-HOAP1	IBM-5292-2
HITACHI-HOAP2	IBM-5555-B01
HITACHI-HOAP3	IBM-5555-C01
HITACHI-HOAP4	IBM-6153
HP-2392	IBM-6154
HP-2621	IBM-6155
HP-2621A	IBM-AED
HP-2621P	IBM-3278-2-E
HP-2623	IBM-3278-3-E

IBM-3278-4-E	TEC
IBM-3278-5-E	TEKTRONIX-4006
IBM-3279-2-E	TEKTRONIX-4010
IBM-3279-3-E	TEKTRONIX-4012
IMLAC	TEKTRONIX-4013
INFOTON-100	TEKTRONIX-4014
INFOTON-400	TEKTRONIX-4023
INFOTONKAS	TEKTRONIX-4024
ISC-8001	TEKTRONIX-4025
LSI-ADM-1	TEKTRONIX-4027
LSI-ADM-11	TEKTRONIX-4105
LSI-ADM-12	TEKTRONIX-4107
LSI-ADM-2	TEKTRONIX-4110
LSI-ADM-20	TEKTRONIX-4112
LSI-ADM-22	TEKTRONIX-4113
LSI-ADM-220	TEKTRONIX-4114
LSI-ADM-3	TEKTRONIX-4115
LSI-ADM-31	TEKTRONIX-4125
LSI-ADM-3A	TEKTRONIX-4404
LSI-ADM-42	TELERAY-1061
LSI-ADM-5	TELERAY-3700
MEMOREX-1240	TELERAY-3800
MICROBEE	TELETEC-DATASCREEN
MICROTERM-ACT-IV	TELETERM-1030
MICROTERM-ACT-V	TELETYPE-33
MICROTERM-ERGO-301	TELETYPE-35
MICROTERM-MIME-1	TELETYPE-37
MICROTERM-MIME-2	TELETYPE-38
MICROTERM-ACT-5A	TELETYPE-40
MICROTERM-TWIST	TELETYPE-43
NEC-5520	TELEVIDEO-910
NETRONICS	TELEVIDEO-912
NETWORK-VIRTUAL-TERMINAL	TELEVIDEO-920
OMRON-8025AG	TELEVIDEO-920B
PERKIN-ELMER-550	TELEVIDEO-920C
PERKIN-ELMER-1100	TELEVIDEO-925
PERKIN-ELMER-1200	TELEVIDEO-955
PERQ	TELEVIDEO-950
PLASMA-PANEL	TELEVIDEO-970
QUME-SPRINT-5	TELEVIDEO-975
QUME-101	TERMINET-1200
QUME-102	TERMINET-300
SOROC	TI-700
SOROC-120	TI-733
SOUTHWEST-TECHNICAL-PRODUCTS-CT82	TI-735
SUN	TI-743
SUPERBEE	TI-745
SUPERBEE-III-M	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  
XEROX-1720  
XTERM  
ZENITH-H19  
ZENITH-Z29  
ZENTEC-30

## DOCUMENTS

- [1] Anderson, B., "TACACS User Identification Telnet Option", RFC-927, BBN, December 1984.
- [2] BBN, "Specifications for the Interconnection of a Host and an IMP", Report 1822, Bolt Beranek and Newman, Cambridge, Massachusetts, revised, December 1981.
- [3] BBN, "User Manual for TAC User Database Tool", Bolt Beranek and Newman, September 1984.
- [4] Ben-Artzi, Amatzia, "Network Management for TCP/IP Network: An Overview", 3Com, May 1988.
- [5] Bennett, C., "A Simple NIFTP-Based Mail System", IEN 169, University College, London, January 1981.
- [6] Bhushan, A., "A Report on the Survey Project", RFC-530, NIC 17375, June 1973.
- [7] Bisbey, R., D. Hollingworth, and B. Britt, "Graphics Language (version 2.1)", ISI/TM-80-18, Information Sciences Institute, July 1980.
- [8] 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.
- [9] Borman, D., Editor, "Telnet Linemode Option", RFC 1116, Cray Research, Inc., August 1989.
- [10] Braden, R., "NETRJS Protocol", RFC-740, NIC 42423, Information Sciences Institute, November 1977.
- [11] Braden, R., and J. Postel, "Requirements for Internet Gateways", RFC-1009, Obsoletes RFC-985, Information Sciences Institute, June 1987.
- [12] Bressler, B., "Remote Job Entry Protocol", RFC-407, NIC 12112, October 1972.
- [13] Bressler, R., "Inter-Entity Communication -- An Experiment", RFC-441, NIC 13773, January 1973.
- [14] Butler, M., J. Postel, D. Chase, J. Goldberger, and

- J. K. Reynolds, "Post Office Protocol - Version 2", RFC-937, Information Sciences Institute, February 1985.
- [15] Case, J., M. Fedor, M. Schoffstall, and J. Davin, "A Simple Network Management Protocol", RFC-1157, (Obsoletes RFC-1067, RFC-1098), SNMP Research, Performance Systems International, Performance Systems International, MIT Laboratory for Computer Science, May 1990.
  - [16] Cass, D., and M. Rose, "ISO Transport Services on Top of the TCP", RFC-983, NTRC, April 1986.
  - [17] Cheriton, D., "VMTP: Versatile Message Transaction Protocol Specification", RFC-1045, pgs 103 & 104, Stanford University, February 1988.
  - [18] Cisco Systems, "Gateway Server Reference Manual", Manual Revision B, January 10, 1988.
  - [19] Clark, D., "PCMAIL: A Distributed Mail System for Personal Computers", RFC-984, MIT, May 1986.
  - [20] Clark, D., M. Lambert, and L. Zhang, "NETBLT: A Bulk Data Transfer Protocol", RFC-969, MIT Laboratory for Computer Science, December 1985.
  - [21] Cohen, D., "On Holy Wars and a Plea for Peace", IEEE Computer Magazine, October 1981.
  - [22] Cohen, D., "Specifications for the Network Voice Protocol", RFC-741, ISI/RR 7539, Information Sciences Institute, March 1976.
  - [23] Cohen, D. and J. Postel, "Multiplexing Protocol", IEN 90, Information Sciences Institute, May 1979.
  - [24] COMPASS, "Semi-Annual Technical Report", CADD-7603-0411, Massachusetts Computer Associates, 4 March 1976. Also as, "National Software Works, Status Report No. 1," RADC-TR-76-276, Volume 1, September 1976. And COMPASS. "Second Semi-Annual Report," CADD-7608-1611, Massachusetts Computer Associates, August 1976.
  - [25] Crispin, M., "Telnet Logout Option", Stanford University-AI, RFC-727, April 1977.
  - [26] Crispin, M., "Telnet SUPDUP Option", Stanford University-AI,

RFC-736, October 1977.

- [27] Crispin, M., "SUPDUP Protocol", RFC-734, NIC 41953, October 1977.
- [28] Crocker, D., "Telnet Output Carriage-Return Disposition Option", RFC-652, October 1974.
- [29] Crocker, D., "Telnet Output Formfeed Disposition Option", RFC-655, October 1974.
- [30] Crocker, D., "Telnet Output Linefeed Disposition", RFC-658, October 1974.
- [31] Crocker, D., "Telnet Output Horizontal Tab Disposition Option", RFC-654, October 1974.
- [32] Crocker, D., "Telnet Output Horizontal Tabstops Option", RFC-653, October 1974.
- [33] Crocker, D., "Telnet Output Vertical Tab Disposition Option", RFC-657, October 1974.
- [34] Crocker, D., "Telnet Output Vertical Tabstops Option", RFC-656, October 1974.
- [35] Crocker, D. and R. Gumpertz, "Revised Telnet Byte Marco Option", RFC-735, November 1977.
- [36] Croft, B., and J. Gilmore, "BOOTSTRAP Protocol (BOOTP)", RFC-951, Stanford and SUN Microsystems, September 1985.
- [37] Davin, J., J. Case, M. Fedor, and M. Schoffstall, "A Simple Gateway Monitoring Protocol", RFC-1028, November 1987.
- [38] Day, J., "Telnet Data Entry Terminal Option", RFC-732, September 1977.
- [39] DCA, "3270 Display System Protocol", #1981-08.
- [40] DDN Protocol Handbook, "Telnet Output Line Width Option", NIC 50005, December 1985.
- [41] DDN Protocol Handbook, "Telnet Output Page Size Option", NIC 50005, December 1985.
- [42] DDN Protocol Handbook, "Telnet Reconnection Option", NIC 50005, December 1985.

- [43] Deering, S., "Host Extensions for IP Multicasting", RFC-1112, Obsoletes RFC-988, RFC-1054, Stanford University, August 1989.
- [44] Elvy, M., and R. Nedved, "Network Mail Path Service", RFC-915, Harvard and CMU, July 1986.
- [45] Feinler, E., editor, "DDN Protocol Handbook", Network Information Center, SRI International, December 1985.
- [46] Feinler, E., editor, "Internet Protocol Transition Workbook", Network Information Center, SRI International, March 1982.
- [47] Feinler, E. and J. Postel, eds., "ARPANET Protocol Handbook", NIC 7104, for the Defense Communications Agency by SRI International, Menlo Park, California, Revised January 1978.
- [48] Finlayson, R., T. Mann, J. Mogul, and M. Theimer, "A Reverse Address Resolution Protocol", RFC-903, Stanford University, June 1984.
- [49] Forgie, J., "ST - A Proposed Internet Stream Protocol", IEN 119, MIT Lincoln Laboratory, September 1979.
- [50] Forsdick, H., "CFTP", Network Message, Bolt Beranek and Newman, January 1982.
- [51] Greenberg, B., "Telnet SUPDUP-OUTPUT Option", RFC-749, MIT-Multics, September 1978.
- [52] Harrenstien, K., "Name/Finger", RFC-742, NIC 42758, SRI International, December 1977.
- [53] Harrenstien, K., M. Stahl, and E. Feinler, "DOD Internet Host Table Specification", RFC-952, Obsoletes RFC-810, October 1985.
- [54] Harrenstien, K., V. White, and E. Feinler, "Hostnames Server", RFC-811, SRI International, March 1982.
- [55] Harrenstien, K., and V. White, "Nickname/Whois", RFC-812, SRI International, March 1982.
- [56] Haverty, J., "XNET Formats for Internet Protocol Version 4", IEN 158, October 1980.
- [57] Hedrick, C., "Telnet Terminal Speed Option", RFC-1079, Rutgers University, December 1988.

- [58] Hedrick, C., "Telnet Remote Flow Control Option", RFC-1080, Rutgers University, December 1988.
- [59] Hinden, R., "A Host Monitoring Protocol", RFC-869, Bolt Beranek and Newman, December 1983.
- [60] Hinden, R., and A. Sheltzer, "The DARPA Internet Gateway", RFC-823, September 1982.
- [61] Hornig, C., "A Standard for the Transmission of IP Datagrams over Ethernet Networks", RFC-894, Symbolics, April 1984.
- [62] Internet Activities Board, J. Postel, Editor, "IAB Official Protocol Standards", RFC-1280, Internet Activities March 1992.
- [63] International Standards Organization, "ISO Transport Protocol Specification - ISO DP 8073", RFC-905, April 1984.
- [64] International Standards Organization, "Protocol for Providing the Connectionless-Mode Network Services", RFC-926, ISO, December 1984.
- [65] Kantor, B., and P. Lapsley, "Network News Transfer Protocol", RFC-977, UC San Diego & UC Berkeley, February 1986.
- [66] Kent, S., and J. Linn, "Privacy Enhancement for Internet Electronic Mail: Part II -- Certificate-Based Key Management", BBNCC and DEC, August 1989.
- [67] Khanna, A., and A. Malis, "The ARPANET AHIP-E Host Access Protocol (Enhanced AHIP)", RFC-1005, BBN Communications Corporation, May 1987.
- [68] Killian, E., "Telnet Send-Location Option", RFC-779, April 1981.
- [69] Korb, J., "A Standard for the Transmission of IP Datagrams Over Public Data Networks", RFC-877, Purdue University, September 1983.
- [70] Levy, S., and T. Jacobson, "Telnet X.3 PAD Option", RFC-1053, Minnesota Supercomputer Center, April 1988.
- [71] Linn, J., "Privacy Enhancement for Internet Electronic Mail: Part I: Message Encipherment and Authentication Procedures", RFC-1113, Obsoletes RFC-989 and RFC-1040, DEC, August 1989.

- [72] Linn, J., "Privacy Enhancement for Internet Electronic Mail: Part III -- Algorithms, Modes, and Identifiers", RFC-1115, DEC, August 1989.
- [73] Lottor, M., "Simple File Transfer Protocol", RFC-913, MIT, September 1984.
- [74] M/A-COM Government Systems, "Dissimilar Gateway Protocol Specification, Draft Version", Contract no. CS901145, November 16, 1987.
- [75] Marcy, G., "Telnet X Display Location Option", RFC-1096, Carnegie Mellon University, March 1989.
- [76] Malis, A., "Logical Addressing Implementation Specification", BBN Report 5256, pp 31-36, May 1983.
- [77] Malkin, G., "KNET/VM Command Message Protocol Functional Overview", Spartacus, Inc., January 4, 1988.
- [78] Metcalfe, R. M. and D. R. Boggs, "Ethernet: Distributed Packet Switching for Local Computer Networks", Communications of the ACM, 19 (7), pp 395-402, July 1976.
- [79] Miller, T., "Internet Reliable Transaction Protocol", RFC-938, ACC, February 1985.
- [80] Mills, D., "Network Time Protocol (Version 1), Specification and Implementation", RFC-1059, University of Delaware, July 1988.
- [81] Mockapetris, P., "Domain Names - Concepts and Facilities", RFC-1034, Obsoletes RFCs 882, 883, and 973, Information Sciences Institute, November 1987.
- [82] Mockapetris, P., "Domain Names - Implementation and Specification", RFC-1035, Obsoletes RFCs 882, 883, and 973, Information Sciences Institute, November 1987.
- [83] Moy, J., "The OSPF Specification", RFC 1131, Proteon, October 1989.
- [84] Nedved, R., "Telnet Terminal Location Number Option", RFC-946, Carnegie-Mellon University, May 1985.
- [85] NSW Protocol Committee, "MSG: The Interprocess Communication Facility for the National Software Works", CADD-7612-2411, Massachusetts Computer Associates, BBN 3237, Bolt Beranek and

Newman, Revised December 1976.

- [86] Onions, J., and M. Rose, "ISO-TP0 bridge between TCP and X.25", RFC-1086, Nottingham, TWG, December 1988.
- [87] Partridge, C. and G. Trewitt, The High-Level Entity Management System (HEMS), RFCs 1021, 1022, 1023, and 1024, BBN/NNSC, Stanford, October, 1987.
- [88] Plummer, D., "An Ethernet Address Resolution Protocol or Converting Network Protocol Addresses to 48-bit Ethernet Addresses for Transmission on Ethernet Hardware", RFC-826, MIT-LCS, November 1982.
- [89] Postel, J., "Active Users", RFC-866, Information Sciences Institute, May 1983.
- [90] Postel, J., and J. Reynolds, "A Standard for the Transmission of IP Datagrams over IEEE 802 Networks", RFC-1042, USC/Information Sciences Institute, February 1988.
- [91] Postel, J., "A Standard for the Transmission of IP Datagrams over Experimental Ethernet Networks", RFC-895, Information Sciences Institute, April 1984.
- [92] Postel, J., "Character Generator Protocol", RFC-864, Information Sciences Institute, May 1983.
- [93] Postel, J., "Daytime Protocol", RFC-867, Information Sciences Institute, May 1983.
- [94] Postel, J., "Discard Protocol", RFC-863, Information Sciences Institute, May 1983.
- [95] Postel, J., "Echo Protocol", RFC-862, Information Sciences Institute, May 1983.
- [96] Postel, J. and J. Reynolds, "File Transfer Protocol", RFC-959, Information Sciences Institute, October 1985.
- [97] Postel, J., "Internet Control Message Protocol - DARPA Internet Program Protocol Specification", RFC-792, Information Sciences Institute, September 1981.
- [98] Postel, J., "Internet Message Protocol", RFC-759, IEN 113, Information Sciences Institute, August 1980.
- [99] Postel, J., "Name Server", IEN 116, Information Sciences

Institute, August 1979.

- [100] Postel, J., "Quote of the Day Protocol", RFC-865, Information Sciences Institute, May 1983.
- [101] Postel, J., "Remote Telnet Service", RFC-818, Information Sciences Institute, November 1982.
- [102] Postel, J., "Simple Mail Transfer Protocol", RFC-821, Information Sciences Institute, August 1982.
- [103] Postel, J., "Telnet End of Record Option", RFC-885, Information Sciences Institute, December 1983.
- [104] Postel, J., "User Datagram Protocol", RFC-768, Information Sciences Institute, August 1980.
- [105] Postel, J., ed., "Internet Protocol - DARPA Internet Program Protocol Specification", RFC-791, Information Sciences Institute, September 1981.
- [106] Postel, J., ed., "Transmission Control Protocol - DARPA Internet Program Protocol Specification", RFC-793, Information Sciences Institute, September 1981.
- [107] Postel, J. and D. Crocker, "Remote Controlled Transmission and Echoing Telnet Option", RFC-726, March 1977.
- [108] Postel, J., and K. Harrenstien, "Time Protocol", RFC-868, Information Sciences Institute, May 1983.
- [109] Postel, J. and J. Reynolds, "Telnet Extended Options - List Option", RFC-861, Information Sciences Institute, May 1983.
- [110] Postel, J. and J. Reynolds, "Telnet Binary Transmission", RFC-856, Information Sciences Institute, May 1983.
- [111] Postel, J. and J. Reynolds, "Telnet Echo Option", RFC-857, Information Sciences Institute, May 1983.
- [112] Postel, J., and J. Reynolds, "Telnet Protocol Specification", RFC-854, Information Sciences Institute, May 1983.
- [113] Postel, J. and J. Reynolds, "Telnet Status Option", RFC-859, Information Sciences Institute, May 1983.
- [114] Postel, J. and J. Reynolds, "Telnet Suppress Go Ahead Option", RFC-858, Information Sciences Institute, May 1983.

- [115] Postel, J. and J. Reynolds, "Telnet Timing Mark Option", RFC-860, Information Sciences Institute, May 1983.
- [116] Rekhter, J., "Telnet 3270 Regime Option", RFC-1041, IBM, January 1988.
- [117] Reynolds, J., "BOOTP Vendor Information Extensions", RFC 1084, Information Sciences Institute, December 1988.
- [118] Reynolds, J. and J. Postel, "Official Internet Protocols", RFC-1011, USC/Information Sciences Institute, May 1987.  
[NOTE: This document is replaced by "IAB Official Protocol Standards" [62].]
- [119] Romano, S., M. Stahl, and M. Recker, "Internet Numbers", RFC-1166, SRI-NIC, May 1990.
- [120] Rose, M., and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based internets", RFC-1155, Performance Systems International, Hughes LAN Systems, May 1990.
- [121] McCloghrie, K., and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets: MIB-II", RFC-1213, Hughes LAN Systems, Performance Systems International, March 1991.
- [122] Rose, M., "Post Office Protocol - Version 3", RFC 1225, PSI, May 1991.
- [123] Seamonson, L. J., and E. C. Rosen, "STUB" Exterior Gateway Protocol", RFC-888, BBN Communications Corporation, January 1984.
- [124] Shuttleworth, B., "A Documentary of MFENet, a National Computer Network", UCRL-52317, Lawrence Livermore Labs, Livermore, California, June 1977.
- [125] Silverman, S., "Output Marking Telnet Option", RFC-933, MITRE, January 1985.
- [126] Sollins, K., "The TFTP Protocol (Revision 2)", RFC-783, MIT/LCS, June 1981.
- [127] Solomon, M., L. Landweber, and D. Neuhengen, "The CSNET Name Server", Computer Networks, v.6, n.3, pp. 161-172, July 1982.
- [128] Solomon, M., and E. Wimmers, "Telnet Terminal Type Option",

- RFC-930, Supercedes RFC-884, University of Wisconsin, Madison, January 1985.
- [129] Sproull, R., and E. Thomas, "A Networks Graphics Protocol", NIC 24308, August 1974.
- [130] St. Johns, M., "Authentication Service", RFC-931, TPSC, January 1985.
- [131] Tappan, D., "The CRONUS Virtual Local Network", RFC-824, Bolt Beranek and Newman, August 1982.
- [132] Taylor, J., "ERPC Functional Specification", Version 1.04, HYDRA Computer Systems, Inc., July 1984.
- [133] "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.
- [134] The High Level Protocol Group, "A Network Independent File Transfer Protocol", INWG Protocol Note 86, December 1977.
- [135] Thomas, Bob, "The Interhost Protocol to Support CRONUS/DIAMOND Interprocess Communication", BBN, September 1983.
- [136] Tovar, "Telnet Extended ASCII Option", RFC-698, Stanford University-AI, July 1975.
- [137] Uttal, J., J. Rothschild, and C. Kline, "Transparent Integration of UNIX and MS-DOS", Locus Computing Corporation.
- [138] Velten, D., R. Hinden, and J. Sax, "Reliable Data Protocol", RFC-908, BBN Communications Corporation, July 1984.
- [139] Waitzman, D., "Telnet Window Size Option", RFC-1073, BBN STC, October, 1988.
- [140] Waitzman, D., C. Partridge, and S. Deering  
"Distance Vector Multicast Routing Protocol", RFC-1075,  
BBN STC and Stanford University, November 1988.

- [141] Wanchow, F., "Password Generator Protocol", RFC-972, WSMR, January 1986.
- [142] Warriar, U., and L. Besaw, "The Common Management Information Services and Protocol over TCP/IP (CMOT)", RFC-1095, Unisys Corp. and Hewlett-Packard, April 1989.
- [143] Welch, B., "The Sprite Remote Procedure Call System", Technical Report, UCB/Computer Science Dept., 86/302, University of California at Berkeley, June 1986.
- [144] Xerox, "Courier: The Remote Procedure Protocol", XSI5 038112, December 1981.
- [145] Yasuda, A., and T. Thompson, "TELNET Data Entry Terminal Option DODIIS Implementation", RFC 1043, DIA, February 1988.
- [146] Simpson, W., "The Point-to-Point Protocol (PPP) for the Transmission of Multi-Protocol Datagrams Over Point-to-Point Links", RFC 1331, Daydreamer, May 1992.
- [147] McGregor, G., "The (PPP) Internet Protocol Control Protocol (IPCP)", RFC 1332, Merit, May 1992.
- [148] Woodburn, W., and D. Mills, "A Scheme for an Internet Encapsulation Protocol: Version 1", RFC 1241, SAIC, University of Delaware, July 1991.
- [149] McCloghrie, K., and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets", Hughes LAN Systems, Performance Systems International, May 1990.
- [150] McCloghrie, K., and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets: MIB-II", RFC 1213, Hughes LAN Systems, Performance Systems International, March 1991.
- [151] McCloghrie, K., Editor, "Extensions to the Generic-Interface MIB", RFC 1229, Hughes LAN Systems, May 1991.
- [152] Waldbusser, S., Editor, "AppleTalk Management Information Base", RFC 1243, Carnegie Mellon University, July 1991.
- [153] Baker, F., and R. Coltun, "OSPF Version 2 Management Information Base", RFC 1253, ACC, Computer Science Center, August 1991.
- [154] Willis, S., and J. Burruss, "Definitions of Managed Objects

- for the Border Gateway Protocol (Version 3)", RFC 1269, Wellfleet Communications Inc., October 1991.
- [155] Waldbusser, S., "Remote Network Monitoring Management Information Base", RFC 1271, Carnegie Mellon University, November 1991.
  - [156] 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.
  - [157] Cook, J., Editor, "Definitions of Managed Objects for the Ethernet-like Interface Types", RFC 1284, Chipcom Corporation, December 1991.
  - [158] McCloghrie, K., and R. Fox, "IEEE 802.4 Token Bus MIB", RFC 1230, Hughes LAN Systems, Inc., Synoptics, Inc., May 1991.
  - [159] 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.
  - [160] Case, J., "FDDI Management Information Base", RFC 1285, SNMP Research, Incorporated, January 1992.
  - [161] Baker, F., and C. Kolb, Editors, "Definitions of Managed Objects for the DS1 Interface Type", RFC 1232, ACC, Performance Systems International, Inc., May 1991.
  - [162] Cox, T., and K. Tesink, Editors, "Definitions of Managed Objects for the DS3 Interface Type", RFC 1233, Bell Communications Research, May 1991.
  - [163] Reynolds, J., "Reassignment of Experimental MIBs to Standard MIBs", RFC 1239, ISI, June 1991.
  - [164] Cox, T., and K. Tesnik, Editors, "Definitions of Managed Objects for the SIP Interface Type", RFC 1304, Bell Communications Research, February 1992.
  - [165] Stewart, B., Editor, "Definitions of Managed Objects for Character Stream Devices", RFC 1316, Xyplex, Inc., April 1992.
  - [166] Stewart, B., Editor, "Definitions of Managed Objects for RS-232-like Hardware Devices", RFC 1317, Xyplex, Inc.,

April 1992.

- [167] Stewart, B., Editor, "Definitions of Managed Objects for Parallel-printer-like Hardware Devices", RFC 1318, Xyplex, Inc., April 1992.
- [168] Brown, C., Baker, F., and C. Carvalho, "Management Information Base for Frame Relay DTEs", RFC 1315, Wellfleet Communications, Inc., Advanced Computer Communications, April 1992.
- [169] Borenstein, N., and N. Freed, "MIME (Multipurpose Internet Mail Extensions): Mechanisms for Specifying and Describing the Format of Internet Message Bodies", RFC 1341, Bellcore, Innosoft, June 1992.
- [170] Simonsen, K., "Character Mnemonics & Character Sets", RFC 1345, Rationel Almen Planlaegning, June 1992.
- [171] Dorner, S., and P. Resnick, "Remote Mail Checking Protocol", RFC 1339, U. of Illinois at Urbana-Champaign, June 1992.
- [172] Everhart, C., Mamakos, L., Ullmann, R., and P. Mockapetris, Editors, "New DNS RR Definitions", RFC 1183, Transarc, University of Maryland, Prime Computer, ISI, October 1990.
- [173] Bradley, T., and C. Brown, "Inverse Address Resolution Protocol", RFC 1293, Wellfleet Communications, Inc., January 1992.
- [174] Manning, B. "DNS NSAP RRs", RFC 1348, Rice University, July 1992.
- [175] Simpson, W., "PPP Link Quality Monitoring", RFC 1333, Daydreamer, May 1992.
- [176] Baker, F., Editor, "Point-to-Point Protocol Extensions for Bridging", RFC 1220, ACC, April 1991.
- [177] 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.

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## Security Considerations

Security issues are not discussed in this memo.

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