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

J. Reynolds
J. Postel
ISI

October 1994

ASSIGNED NUMBERS

Status of this Memo

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

OVERVIEW

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

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

INTRODUCTION

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

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

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

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

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

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

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

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

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

Joyce K. Reynolds
Internet Assigned Numbers Authority
USC - Information Sciences Institute
4676 Admiralty Way
Marina del Rey, California 90292-6695

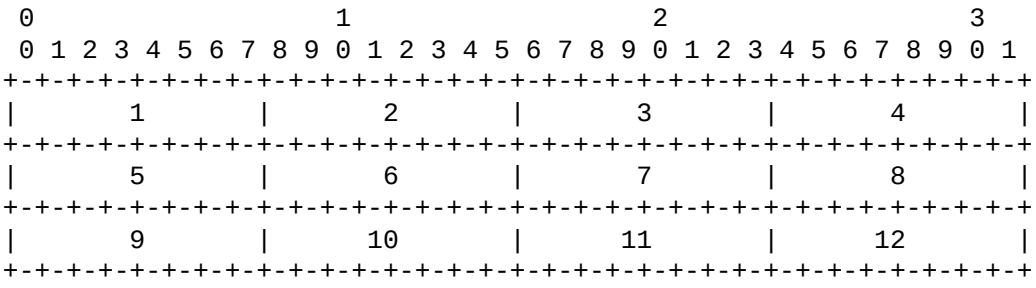
Electronic mail: IANA@ISI.EDU
Phone: +1 310-822-1511

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

Data Notations

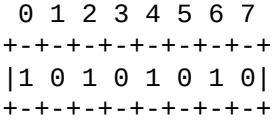
The convention in the documentation of Internet Protocols is to express numbers in decimal and to picture data in "big-endian" order [COHEN]. That is, fields are described left to right, with the most significant octet on the left and the least significant octet on the right.

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



Transmission Order of Bytes

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



Significance of Bits

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

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

Special Addresses

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

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

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

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

   or

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

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

(a) {0, 0}

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

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

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

(c) { -1, -1}

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

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

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

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

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

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

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

(g) {127, <any>}

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

REFERENCES

[COHEN] Cohen, D., "On Holy Wars and a Plea for Peace", IEEE Computer Magazine, October 1981.

[CIDR1] Fuller, V., T. Li, J. Yu, and K. Varadhan, "Classless Inter-Domain Routing (CIDR): an Address Assignment and Aggregation Strategy", RFC 1519, September 1993.

[CIDR2] Rekhter, Y., and T. Li, "An Architecture for IP Address Allocation with CIDR", RFC 1518, September 1993.

[]

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

VERSION NUMBERS

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

Assigned Internet Version Numbers

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

REFERENCES

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

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

PEOPLE

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

[JWF] Jim Forgie <FORGIE@XN.LL.MIT.ED>

[RH6] Robert Hinden <Hinden@ENG.SUN.COM>

[RXU] Robert Ullmann <ariel@world.std.com>

[PXF] Paul Francis <francis@cactus.ntt.jp>

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

[]

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

PROTOCOL NUMBERS

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

Assigned Internet Protocol Numbers

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

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

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

REFERENCES

[CFTP] Forsdick, H., "CFTP", Network Message, Bolt Beranek and Newman, January 1982.

[CISCO] Cisco Systems, "Gateway Server Reference Manual", Manual Revision B, January 10, 1988.

[DDN] Feinler, E., Editor, "DDN Protocol Handbook", Network Information Center, SRI International, December 1985.

[DGP] M/A-COM Government Systems, "Dissimilar Gateway Protocol Specification, Draft Version", Contract no. CS901145, November 16, 1987.

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

[IEN90] Cohen, D. and J. Postel, "Multiplexing Protocol", IEN 90, USC/Information Sciences Institute, May 1979.

[IEN119] Forgie, J., "ST - A Proposed Internet Stream Protocol", IEN 119, MIT Lincoln Laboratory, September 1979.

[IEN158] Haverty, J., "XNET Formats for Internet Protocol Version 4", IEN 158, October 1980.

[MFENET] Shuttleworth, B., "A Documentary of MFENet, a National Computer Network", UCRL-52317, Lawrence Livermore Labs, Livermore, California, June 1977.

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

[SPRITE] Welch, B., "The Sprite Remote Procedure Call System", Technical Report, UCB/Computer Science Dept., 86/302, University of California at Berkeley, June 1986.

[RFC741] Cohen, D., "Specifications for the Network Voice Protocol", RFC 741, ISI/RR 7539, USC/Information Sciences Institute, March 1976.

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

[RFC791] Postel, J., "Internet Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 791, DARPA, September 1981.

[RFC792] Postel, J., "Internet Control Message Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 792, USC/Information Sciences Institute, September 1981.

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

[RFC823] Hinden, R., and A. Sheltzer, "The DARPA Internet Gateway", RFC 823, BBN, September 1982.

[RFC869] Hinden, R., "A Host Monitoring Protocol", RFC 869, Bolt Beranek and Newman, December 1983.

[RFC888] Seamonson, L., and E. Rosen, "STUB" Exterior Gateway Protocol", RFC 888, BBN Communications Corporation, January 1984.

[RFC905] International Standards Organization, "ISO Transport Protocol Specification - ISO DP 8073", RFC 905, April 1984.

[RFC908] Velten, D., R. Hinden, and J. Sax, "Reliable Data Protocol", RFC 908, BBN Communications Corporation, July 1984.

[RFC938] Miller, T., "Internet Reliable Transaction Protocol", RFC 938, ACC, February 1985.

[RFC969] Clark, D., M. Lambert, and L. Zhang, "NETBLT: A Bulk Data Transfer Protocol", RFC 969, MIT Laboratory for Computer Science, December 1985.

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

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

[RFC1241] Woodburn, W., and D. Mills, " A Scheme for an Internet Encapsulation Protocol: Version 1", RFC 1241, SAIC, University of Delaware, July 1991.

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

PEOPLE

[BCH2] Barry Howard <Howard@NMFECC.LLNL.GOV>

[BK29] Brian Kantor <brian@UCSD.EDU>

[BN7] <mystery contact>

[BWB6] Barry Boehm <boehm@ARPA.MIL>

[BXH] Brian Horn <---none--->

[BXW] Bruce Willins <---none--->

[DDC1] David Clark <ddc@LCS.MIT.EDU>

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

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

[DXE1] Deborah Estrin <estrin@usc.edu>

[DXF] Dirk Fromhein <df@watershed.com>

[DXM2] David Mittnacht <---none--->

[DXP2] Dave Presotto <presotto@reseach.att.co

[David Johnson] <mystery contact>

[GAL5] Guillermo A. Loyola <LOYOLA@IBM.COM>

[GLENN] K. Robert Glenn <glenn@osi.ncsl.nist.gov>

[GXC] Greg Chesson <Greg@SGI.COM>

[GXS] Guenther Schreiner <snmp-admin@ira.uka.de>

[GXT1] Gene Tsudik <tsudik@USC.EDU>

[HCF2] Harry Forsdick <Forsdick@BBN.COM>

[HWB] Hans-Werner Braun <HWB@MCR.UMICH.EDU>

[HXH] Howard Hart <hch@hybrid.com>

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

[JC120] <mystery contact>

[JFH2] Jack Haverty <jhaverty@ORACLE.COM>

[JI6] John Ioannidis <ji@CS.COLUMBIA.EDU>

[JTM4] John Moy <jmoy@PROTEON.COM>

[JWF] Jim Forgie <FORGIE@XN.LL.MIT.EDU>

[JXS] Jim Stevens <Stevens@ISI.EDU>

[KATZ] Dave Katz <dkatz@cisco.com>

[MB] Mike Brescia <Brescia@CCV.BBN.COM>

[MBG] Michael Greenwald <Greenwald@SCRC-STONY-BROOK.SYMBOLICS.COM>

[ML109] Mike Little <little@MACOM4.ARPA>

[MTR] Marshall T. Rose <mrose@dbc.mtview.ca.us>

[MXS1] Martha Steenstrup <MSteenst@BBN.COM>

[NC3] J. Noel Chiappa <JNC@XX.LCS.MIT.EDU>

[PK] Peter Kirstein <Kirstein@NSS.CS.UCL.AC.UK>

[PXL1] Paul Liu <---none--->

[RH6] Robert Hinden <Hinden@ENG.SUN.COM>

[RTB3] Bob Braden <braden@isi.edu>

[RC77] <mystery contact>

[RWS4] Robert W. Scheifler <RWS@XX.LCS.MIT.EDU>

[RXB3] Robert Woodburn <woody@cseic.saic.com>

[RXH1] Russ Housley <Russ_Housley.McLean_CSD@xerox.com>

[SAF3] Stuart A. Friedberg <stuart@CS.WISC.EDU>

[SC3] Steve Casner <casner@isi.edu

[SGC] Steve Chipman <Chipman@F.BBN.COM>

[SHB] Steven Blumenthal <BLUMENTHAL@VAX.BBN.COM>

[Sue Hares] Sue Hares <skh@merit.edu>

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

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

[Tony Li] Tony Li <tli@cisco.com>

[TXM] Trudy Miller <Trudy@ACC.COM>

[VXD] Victor Dafoulas <---none--->

[WM3] William Melohn <Melohn@SUN.COM>

[WXC] Wesley Craig <Wesley.Craig@terminator.cc.umich.edu>

[ZSU] Zaw-Sing Su <ZSu@TSCA.ISTC.SRI.>

[]

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

WELL KNOWN PORT NUMBERS

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

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

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

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

Port Assignments:

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

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

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

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

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

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

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

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

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

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

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

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

```
smux            199/udp    SMUX
#                          Marshall Rose <mrose@dbc.mtview.ca.us>
src             200/tcp    IBM System Resource Controller
src             200/udp    IBM System Resource Controller
#                          Gerald McBrearty <---none--->
at-rtmp         201/tcp    AppleTalk Routing Maintenance
at-rtmp         201/udp    AppleTalk Routing Maintenance
at-nbp          202/tcp    AppleTalk Name Binding
at-nbp          202/udp    AppleTalk Name Binding
at-3            203/tcp    AppleTalk Unused
at-3            203/udp    AppleTalk Unused
at-echo         204/tcp    AppleTalk Echo
at-echo         204/udp    AppleTalk Echo
at-5            205/tcp    AppleTalk Unused
at-5            205/udp    AppleTalk Unused
at-zis          206/tcp    AppleTalk Zone Information
at-zis          206/udp    AppleTalk Zone Information
at-7            207/tcp    AppleTalk Unused
at-7            207/udp    AppleTalk Unused
at-8            208/tcp    AppleTalk Unused
at-8            208/udp    AppleTalk Unused
#                          Rob Chandhok <chandhok@gnome.cs.cmu.edu>
tam             209/tcp    Trivial Authenticated Mail Protocol
tam             209/udp    Trivial Authenticated Mail Protocol
#                          Dan Bernstein <brnstnd@stealth.acf.nyu.edu>
z39.50          210/tcp    ANSI Z39.50
z39.50          210/udp    ANSI Z39.50
#                          Mark Needleman
#                         <mhnur%uccmvsa.bitnet@cornell.cit.cornell.edu>
914c/g          211/tcp    Texas Instruments 914C/G Terminal
914c/g          211/udp    Texas Instruments 914C/G Terminal
#                          Bill Harrell <---none--->
anet            212/tcp    ATEXSSTR
anet            212/udp    ATEXSSTR
#                          Jim Taylor <taylor@heart.epps.kodak.com>
ipx             213/tcp    IPX
ipx             213/udp    IPX
#                          Don Provan <donp@xlnvax.novell.com>
vmpwscs         214/tcp    VM PWSCS
vmpwscs         214/udp    VM PWSCS
#                          Dan Shia <dset!shia@uunet.UU.NET>
softpc          215/tcp    Insignia Solutions
softpc          215/udp    Insignia Solutions
#                          Martyn Thomas <---none--->
atls            216/tcp    Access Technology License Server
atls            216/udp    Access Technology License Server
#                          Larry DeLuca <henrik@EDDIE.MIT.EDU>
dbase           217/tcp    dBASE Unix
```

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

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

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

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

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

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

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

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

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

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

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

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

REGISTERED PORT NUMBERS

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

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

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

The Registered Ports are in the range 1024-65535.

Port Assignments:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

REFERENCES

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

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

[]

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

INTERNET MULTICAST ADDRESSES

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

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

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

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

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

224.252.0.0-224.255.255.255 DIS transient groups [Joel Snyder]

232.0.0.0-232.255.255.255 VMTP transient groups [RFC1045,DRC3]

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

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

REFERENCES

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

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

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

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

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

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

PEOPLE

<arnoldm@microsoft.com>

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

[Bob Brenner]

<bloomer@birch.crd.ge.com>

[Braden] Bob Braden <braden@isi.edu

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

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

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

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

[Tim Clark]

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

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

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

[Dino Farinacci]

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

<hgxing@aol.com>

[IANA] IANA <iana@isi.edu>

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

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

[KS14] <mystery contact>

[Andrew Maffei]

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

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

[Guido van Rossum]

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

[Joel Snyder]

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

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

<veizades@ftp.com>

[]

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

SUN RPC NUMBERS

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

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

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

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

Port numbers count up sequentially.

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

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

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

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

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

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

Services should be started in this order:

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

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

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

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

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

```
   #define IPPORT_USERRESERVED     5000
```

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

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

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

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

[]

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

IP OPTION NUMBERS

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

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

IP TIME TO LIVE PARAMETER

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

IP TOS PARAMETERS

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

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

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

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

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

The following are recommended values for TOS:

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

Errors	0000	
Requests	0000 (4)	
Responses	<same as request> (4)	
Any IGP	0010	(maximize reliability)
EGP	0000	
SNMP	0010	(maximize reliability)
BOOTP	0000	

Notes:

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

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

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

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

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

REFERENCES

[RFC791] Postel, J., "Internet Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 791, DARPA, September 1981.

[RFC1108] Kent, S., "U.S. Department of Defense Security Options for the Internet Protocol", RFC 1108, BBN Communications, November 1991.

[RFC1191] Mogul, J., and S. Deering, "Path MTU Discovery", RFC 1191, DECWRL, Stanford University, November 1990.

[RFC1349] Almquist, P., "Type of Service in the Internet Protocol Suite", RFC 1349, Consultant, July 1992.

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

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

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

[Ullmann IPv7]

PEOPLE

[Estrin] Deborah Estrin <Estrin@usc.edu>

[Finn] Greg Finn <Finn@isi.edu>

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

[Ullmann] Robert Ullmann <ariel@world.std.com>

[]

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

ICMP TYPE NUMBERS

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

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

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

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

```
  2     Unassigned                                    [JBP]

  3     Destination Unreachable                    [RFC792]

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

  4     Source Quench                              [RFC792]
        Codes
            0  No Code

  5     Redirect                                   [RFC792]

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

  6     Alternate Host Address                        [JBP]

        Codes
            0  Alternate Address for Host

  7     Unassigned                                    [JBP]

  8     Echo                                       [RFC792]

        Codes
            0  No Code

  9     Router Advertisement                      [RFC1256]

        Codes
```

0 No Code

10 Router Selection [RFC1256]

Codes
0 No Code

11 Time Exceeded [RFC792]

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

12 Parameter Problem [RFC792]

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

13 Timestamp [RFC792]

Codes
0 No Code

14 Timestamp Reply [RFC792]

Codes
0 No Code

15 Information Request [RFC792]

Codes
0 No Code

16 Information Reply [RFC792]

Codes
0 No Code

17 Address Mask Request [RFC950]

Codes
0 No Code

18 Address Mask Reply [RFC950]

	Codes 0 No Code	
19	Reserved (for Security)	[Solo]
20-29	Reserved (for Robustness Experiment)	[ZSu]
30	Traceroute	[RFC1393]
31	Datagram Conversion Error	[RFC1475]
32	Mobile Host Redirect	[David Johnson]
33	IPv6 Where-Are-You	[Bill Simpson]
34	IPv6 I-Am-Here	[Bill Simpson]
35	Mobile Registration Request	[Bill Simpson]
36	Mobile Registration Reply	[Bill Simpson]

REFERENCES

[RFC792] Postel, J., "Internet Control Message Protocol", STD 5, RFC 792, USC/Information Sciences Institute, September 1981.

[RFC950] Mogul, J., and J. Postel, "Internet Standard Subnetting Procedure", STD 5, RFC 950, Stanford, USC/Information Sciences Institute, August 1985.

[RFC1108] Kent, S., "U.S. Department of Defense Security Options for the Internet Protocol", RFC 1108, November 1991.

[RFC1256] Deering, S., Editor, "ICMP Router Discovery Messages", RFC 1256, Xerox PARC, September 1991.

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

[RFC1475] Ullmann, R., "TP/IX: The Next Internet", RFC 1475, Process Software Corporation, June 1993.

PEOPLE

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

[David Johnson]

[Bill Simpson] <Bill.Simpson@um.cc.umich.edu> September, 1994.

[Solo]

[ZSu] Zaw-Sing Su <ZSu@TSCA.ISTC.SRI.COM>

[]

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

TCP OPTION NUMBERS

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

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

TCP ALTERNATE CHECKSUM NUMBERS

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

REFERENCES

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

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

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

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

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

[RFC1693] ?????

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

PEOPLE

[Braden] Bob Braden <braden@isi.edu>

[Knowles] Stev Knowles <stev@ftp.com>

[Kay] J. Kay <jkay@ucsd.edu>

[Subbu & Monroe] <mystery contact>

[]

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

TELNET OPTIONS

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

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

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

Telnet Authentication Types

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

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

REFERENCES

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

[NIC50005] DDN Protocol Handbook, "Telnet Reconnection Option", "Telnet Output Line Width Option", "Telnet Output Page Size Option", NIC 50005, December 1985.

[RFC652] Crocker, D., "Telnet Output Carriage-Return Disposition Option", RFC 652, UCLA-NMC, October 1974.

[RFC653] Crocker, D., "Telnet Output Horizontal Tabstops Option", RFC 653, UCLA-NMC, October 1974.

[RFC654] Crocker, D., "Telnet Output Horizontal Tab Disposition Option", RFC 654, UCLA-NMC, October 1974.

[RFC655] Crocker, D., "Telnet Output Formfeed Disposition Option", RFC 655, UCLA-NMC, October 1974.

[RFC656] Crocker, D., "Telnet Output Vertical Tabstops Option", RFC 656, UCLA-NMC, October 1974.

[RFC657] Crocker, D., "Telnet Output Vertical Tab Disposition Option", RFC 657, UCLA-NMC, October 1974.

[RFC658] Crocker, D., "Telnet Output Linefeed Disposition", RFC 658, UCLA-NMC, October 1974.

[RFC698] Tovar, "Telnet Extended ASCII Option", RFC 698, Stanford University-AI, July 1975.

[RFC726] Postel, J. and D. Crocker, "Remote Controlled Transmission and Echoing Telnet Option", RFC 726, SRI-ARC, UC Irvine, March 1977.

[RFC727] Crispin, M., "Telnet Logout Option", RFC 727, Stanford University-AI, April 1977.

[RFC734] Crispin, M., "SUPDUP Protocol", RFC 734, Stanford, October 1977.

[RFC735] Crocker, D. and R. Gumpertz, "Revised Telnet Byte Marco Option", RFC 735, Rand, CMU, November 1977.

[RFC736] Crispin, M., "Telnet SUPDUP Option", Stanford University-AI, RFC 736, Stanford, October 1977.

[RFC749] Greenberg, B., "Telnet SUPDUP-OUTPUT Option", RFC 749, MIT-Multics, September 1978.

[RFC779] Killian, E., "Telnet Send-Location Option", RFC 779, LLL, April 1981.

[RFC856] Postel, J. and J. Reynolds, "Telnet Binary Transmission", STD 27, RFC 856, USC/Information Sciences Institute, May 1983.

[RFC857] Postel, J. and J. Reynolds, "Telnet Echo Option", STD 28, RFC 857, USC/Information Sciences Institute, May 1983.

[RFC858] Postel, J. and J. Reynolds, "Telnet Suppress Go Ahead Option", STD 29, RFC 858, USC/Information Sciences Institute, May 1983.

[RFC859] Postel, J. and J. Reynolds, "Telnet Status Option", STD 30, RFC 859, USC/Information Sciences Institute, May 1983.

[RFC860] Postel, J. and J. Reynolds, "Telnet Timing Mark Option", STD 31, RFC 860, USC/Information Sciences Institute, May 1983.

[RFC861] Postel, J. and J. Reynolds, "Telnet Extended Options - List Option", STD 32, RFC 861, USC/Information Sciences Institute, May 1983.

[RFC885] Postel, J., "Telnet End of Record Option", RFC 885, USC/Information Sciences Institute, December 1983.

[RFC927] Anderson, B., "TACACS User Identification Telnet Option", RFC 927, BBN, December 1984.

[RFC933] Silverman, S., "Output Marking Telnet Option", RFC 933, MITRE, January 1985.

[RFC946] Nedved, R., "Telnet Terminal Location Number Option", RFC 946, Carnegie-Mellon University, May 1985.

[RDC1041] Rekhter, J., "Telnet 3270 Regime Option", RFC 1041, IBM, January 1988.

[RFC1043] Yasuda, A., and T. Thompson, "TELNET Data Entry Terminal Option DODIIS Implementation", RFC 1043, DIA, February 1988.

[RFC1053] Levy, S., and T. Jacobson, "Telnet X.3 PAD Option", RFC 1053, Minnesota Supercomputer Center, April 1988.

[RFC1073] Waitzman, D., "Telnet Window Size Option", RFC 1073, BBN STC, October, 1988.

[RFC1079] Hedrick, C., "Telnet Terminal Speed Option", RFC 1079, Rutgers University, December 1988.

[RFC1091] VanBokkelen, J., "Telnet Terminal Type Option", RFC 1091, FTP Software, Inc., February 1989.

[RFC1096] Marcy, G., "Telnet X Display Location Option", RFC 1096, Carnegie Mellon University, March 1989.

[RFC1184] Borman, D., Editor, "Telnet Linemode Option", RFC 1184, Cray Research, Inc., October 1990.

[RFC1372] Hedrick, C., and D. Borman, "Telnet Remote Flow Control Option", RFC 1372, Rutgers University, Cray Research, Inc., October 1992.

[RFC1408] Borman, D., Editor, "Telnet Environment Option", RFC 1408, Cray Research, Inc., January 1993.

[RFC1409] Borman, D., Editor, "Telnet Authentication Option", RFC 1409, Cray Research, Inc., January 1993.

[RFC1572] Alexander, S., Editor, "Telnet Environment Option", RFC1572, Lachman Technology, Inc., January 1994.

[RFC1647] Kelly, B., "TN3270 Enhancements", RFC1647, Auburn University, July 1994.

PEOPLE

[BA4] Brian Anderson <baanders@CCQ.BBN.CO>

[CLH3] Charles Hedrick <HEDRICK@ARAMIS.RUTGERS.EDU>

[DB14] Dave Borman <dab@CRAY.COM>

[DW183] David Waitzman <dwaitzman@BBN.COM>

[EAK4] Earl Kill <EAK@MORDOR.S1.GOV>

[GM23] Glenn Marcy <Glenn.Marcy@A.CS.CMU.EDU>

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

[MRC] Mark Crispin <MRC@WSMR-SIMTEL20.ARMY.MIL>

[MS56] Marvin Solomon <solomon@CS.WISC.EDU>

[RN6] Rudy Nedved <Rudy.Nedved@CMU-CS-A.>

[Schoch] Steven Schoch <schoch@sheba.arc.nasa.gov>

[SL70] Stuart Levy <slevy@UC.MSC.UMN.EDU>

[SXS] Steve Silverman <Blankert@MITRE-GATEWAY.ORG>

[YXR] Yakov Rekhter <Yakov@IBM.COM>

[]

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

DOMAIN NAME SYSTEM PARAMETERS

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

Domain System Parameters:

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

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

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

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

REFERENCES

[RFC1034] Mockapetris, P., "Domain Names - Concepts and Facilities", STD 13, RFC 1034, USC/Information Sciences Institute, November 1987.

[RFC1035] Mockapetris, P., "Domain Names - Implementation and Specification", STD 13, RFC 1035, USC/Information Sciences Institute, November 1987.

[RFC1183] Everhart, C., Mamakos, L., Ullmann, R., and P. Mockapetris, Editors, "New DNS RR Definitions", RFC 1183, Transarc, University of Maryland, Prime Computer, USC/Information Sciences Institute, October 1990.

[RFC1348] Manning, B., "DNS NSAP RRs", RFC 1348, Rice University, July 1992.

[RFC1664] Allocchio, C., Bonito, A., Cole, B., Giordano, S., and R. Hagens, "Using the Internet DNS to Distribute RFC1327 Mail Address Mapping Tables", GARR-Italy, Cisco Systems Inc., Centro Svizzero Calcolo Scientifico, Advanced Network & Services, August 1994.

PEOPLE

[Susan Thomson] Susan Thomson <set@swift.bellcore.com>

[PM1] Paul Mockapetris <pvm@isi.edu>

[Donald Eastlake] Donald E. Eastlake, III <dee@ranger.enet.dec.com>

[Craig Farrell]

[]

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

MAIL ENCODING HEADER FIELD KEYWORDS

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

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

MAIL ENCRYPTION TYPES

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

ESMTP MAIL KEYWORDS

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

Keywords	Description	Reference

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

MAIL EXTENSION TYPES

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

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

MAIL SYSTEM NAMES

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

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

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

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

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

Mail System Name	Description	Reference
mcimail	MCI Mail	

MAIL TRANSMISSION TYPES

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

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

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

REFERENCES

[ANSI-X12]

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

[IS-10646]

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

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

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

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

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

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

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

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

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

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

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

PEOPLE

[Eric Allman]

[]

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

BOOTP AND DHCP PARAMETERS

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

BOOTP Vendor Extensions and DHCP Options are listed below:

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

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

REFERENCES

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

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

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

[]

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

ADDRESS FAMILY NUMBERS

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

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

[]

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

FOOBAR AF NUMBERS

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

Assigned FOOBAR Address Families

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

REFERENCES

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

[]

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

DIRECTORY SYSTEM NAMES

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

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

REFERENCES

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

[]

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

PUBLISHER IDENTIFICATION CODE

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

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

REFERENCES

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

PEOPLE

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

[TXC] Tim Clement <timc@cs.man.ac.uk>

[]

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

OSPF AUTHENTICATION CODES

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

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

REFERENCES

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

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

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

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

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

[]

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

MEDIA TYPES

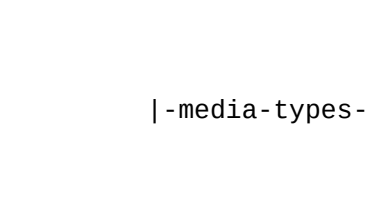
[RFC1521] specifies that Content Types, Content Subtypes, Character Sets, Access Types, and Conversion values for MIME mail will be assigned and listed by the IANA.

Content Types and Subtypes

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

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

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



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

Character Sets

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

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

Access Types

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

Conversion Values

Conversion values or Content Transfer Encodings.

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

MIME / X.400 MAPPING TABLES

MIME to X.400 Table

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

Abbreviation: EBP - Extended Body Part

X.400 to MIME Table

Basic Body Parts

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

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

REFERENCES

[MacMime] Work in Progress.

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

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

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

PEOPLE

[Larry Campbell]

[Dave Crocker] Dave Crocker <dcrocker@mordor.stanford.edu>

[Terry Crowley]

[NSB] Nathaniel Borenstein <nsb@bellcore.com>

[MTR] Marshall Rose <mrose@dbc.mtview.ca.us>

[Paul Lindner]

[PXF] Patrik Faltstrom <paf@nada.kth.se>

[Ehud Shapiro]

[Henry Spencer]

[]

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

CHARACTER SETS

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

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

Character Set	Reference

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

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

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

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

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

Name: INVARIANT [RFC1345,KXS2]

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

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

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

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

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

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

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

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

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

Alias: KSC_5601
Alias: korean

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

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

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

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

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

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

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

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

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

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

Name: latin-greek [RFC1345,KXS2]

Source: ECMA registry
Alias: iso-ir-19

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

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

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

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

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

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

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

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

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

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

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

Alias: iso-ir-55

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

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

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

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

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

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

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

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

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

Alias: ISO646-HU
Alias: hu

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Alias: l3

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Alias: ISO-8859-5
Alias: cyrillic

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

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

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

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

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

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

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

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

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

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

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

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

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

Name: us-dk [RFC1345,KXS2]

Name: dk-us [RFC1345,KXS2]

Name: JIS_X0201 [RFC1345,KXS2]
Alias: X0201

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Alias: CP284
Alias: ebcdic-cp-es

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

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

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

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

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

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

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

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

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

Alias: 850

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

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

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

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

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

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

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

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

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

Name: IBM865 [RFC1345,KXS2]

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Name: UNKNOWN-8BIT [RFC1428]

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

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

Name: VISCII [RFC1456]
Source: RFC 1456

Name: VIQR [RFC1456]
Source: RFC 1456

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

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

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

REFERENCES

[RFC1345] Simonsen, K., "Character Mnemonics & Character Sets", RFC 1345, Rationel Almen Planlaegning, Rationel Almen Planlaegning, June 1992.

[RFC1428] Vaudreuil, G., "Transition of Internet Mail from Just-Send-8 to 8bit-SMTP/MIME", RFC1428, CNRI, February 1993.

[RFC1456] Vietnamese Standardization Working Group, "Conventions for Encoding the Vietnamese Language VISCII: VIetnamese Standard Code for Information Interchange VIQR: VIetnamese Quoted-Readable Specification Revision 1.1", RFC 1456, May 1993.

[RFC1468] Murai, J., Crispin, M., and E. van der Poel, "Japanese Character Encoding for Internet Messages", RFC 1468,

Keio University, Panda Programming, June 1993.

[RFC1489] Chernov, A., "Registration of a Cyrillic Character Set", RFC1489, RELCOM Development Team, July 1993.

[RFC1554] Ohta, M., and K. Handa, "ISO-2022-JP-2: Multilingual Extension of ISO-2022-JP", RFC1554, Tokyo Institute of Technology, ETL, December 1993.

[RFC1556] Nussbacher, H., "Handling of Bi-directional Texts in MIME", RFC1556, Israeli Inter-University, December 1993.

[RFC1557] Choi, U., Chon, K., and H. Park, "Korean Character Encoding for Internet Messages", KAIST, Solvit Chosun Media, December 1993.

[RFC1641] Goldsmith, D., and M. Davis, "Using Unicode with MIME", RFC1641, Taligent, Inc., July 1994.

[RFC1642] Goldsmith, D., and M. Davis, "UTF-7", RFC1642, Taligent, Inc., July 1994.

PEOPLE

[KXS2] Keld Simonsen <Keld.Simonsen@dkuug.dk>

[Choi] Uhhyung Choi <uhhyung@kaist.ac.kr>

[Murai] Jun Murai <jun@wide.ad.jp>

[Ohta] Masataka Ohta <mohta@cc.titech.ac.jp>

[Nussbacher] Hank Nussbacher <hank@vm.tau.ac.il>

[]

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

NETWORK MANAGEMENT PARAMETERS

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

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

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

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

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

The major branches are:

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

SMI Network Management Directory Codes:

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

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

SMI Network Management MGMT Codes:

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

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

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

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

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

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

(1.3.6.1.2.1.2.2.1.3)

ifType definitions

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

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

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

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

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

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

(1.3.6.1.2.1.10.23)

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

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

(1.3.6.1.2.1.27.2.1.3)

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

Decimal	Name	Description
0	Reserved	

(1.3.6.1.2.1.27.3)

(1.3.6.1.2.1.27.4)

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

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

(1.3.6.1.2.1.28.2.1.24)

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

Decimal	Name	Description
0	Reserved	

SMI Network Management Experimental Codes:

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

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

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

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

  * = obsoleted
```

SMI Private Codes:

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

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

SMI Private Enterprise Codes:

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

See the file "enterprise-numbers".

SMI Security Codes:

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

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

SMI SNMPv2 Codes:

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

SMI mail Codes:

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

```
   1     mime-mhs
```

REFERENCES

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

MIT, December 1987.

[2] Kohl, J., and B.C. Neuman, "The Kerberos Network Authentication Service (V5)" work in progress, September 1992.

[RFC1028] Davin, J., J. Case, M. Fedor, and M. Schoffstall, "A Simple Gateway Monitoring Protocol", RFC 1028, Proteon, Inc., University of Tennessee at Knoxville, Cornell University, Rensselaer Polytechnic Institute, November 1987.

[RFC1095] Warrier, U., and L. Besaw, "The Common Management Information Services and Protocol over TCP/IP (CMOT)", RFC 1095, Unisys Corp., Hewlett-Packard, April 1989.

[RFC1155] Rose, M., and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based internets", STD 16, RFC 1155, Performance Systems International, Hughes LAN Systems, May 1990.

[RFC1157] Case, J., M. Fedor, M. Schoffstall, and J. Davin, "A Simple Network Management Protocol", STD 15, RFC 1157, SNMP Research, Performance Systems International, Performance Systems International, MIT Laboratory for Computer Science, May 1990.

[RFC1213] McCloghrie, K., and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets: MIB-II", STD 17, RFC 1213, Hughes LAN Systems, Performance Systems International, March 1991.

[RFC1229] McCloghrie, K., Editor, "Extensions to the Generic-Interface MIB", RFC 1229, Hughes LAN Systems, Inc., May 1991.

[RFC1230] McCloghrie, K., and R. Fox, "IEEE 802.4 Token Bus MIB", RFC 1230, Hughes LAN Systems, Inc., Synoptics, Inc., May 1991.

[RFC1231] McCloghrie, K., Fox, R., and E. Decker, "IEEE 802.5 Token Ring MIB", RFC 1231, Hughes LAN Systems, Inc., Synoptics, Inc., cisco Systems, Inc., May 1991.

[RFC1239] Reynolds, J., "Reassignment of Experimental MIBs to Standard MIBs", RFC 1239, USC/Information Sciences Institute, ISI, June 1991.

[RFC1243] Waldbusser, S., Editor, "AppleTalk Management Information Base", RFC 1243, Carnegie Mellon University, July 1991.

[RFC1253] Baker, F., and R. Coltun, "OSPF Version 2 Management Information Base", RFC 1253, ACC, Computer Science Center, August 1991.

[RFC1271] Waldbusser, S., "Remote Network Monitoring Management Information Base", RFC 1271, Carnegie Mellon University, November 1991.

[RFC1284] Cook, J., Editor, "Definitions of Managed Objects for the Ethernet-like Interface Types", RFC 1284, Chipcom Corporation, December 1991.

[RFC1285] Case, J., "FDDI Management Information Base", RFC 1285, SNMP Research, Incorporated, January 1992.

[RFC1286] Decker, E., Langille, P., Rijsinghani, A., and K. McCloghrie, "Definitions of Managed Objects for Bridges", RFC 1286, cisco Systems, Inc., DEC, Hughes LAN Systems, Inc., December 1991.

[RFC1304] Cox, T., and K. Tesnik, Editors, "Definitions of Managed Objects for the SIP Interface Type", RFC 1304, Bell Communications Research, February 1992.

[RFC1315] Brown, C., Baker, F., and C. Carvalho, "Management Information Base for Frame Relay DTEs", RFC 1315, Wellfleet Communications, Inc., Advanced Computer Communications, April 1992.

[RFC1353] McCloghrie, K., Davin, J., and J. Galvin, "Definitions of Managed Objects for Administration of SNMP Parties", RFC 1353, Hughes LAN Systems, Inc., MIT Laboratory for Computer Science, Trusted Information Systems, Inc., July 1992.

[RFC1381] Throop, D., and F. Baker, "SNMP MIB Extension for X.25 LAPB", RFC 1381, Data General Corporation, Advanced Computer Communications, November 1992.

[RFC1382] Throop, D., Editor, "SNMP MIB Extension for the X.25 Packet Layer", RFC 1382, Data General Corporation, November 1992.

[RFC1389] Malkin, G., and F. Baker, "RIP Version 2 MIB Extension", RFC 1389, Xylogics, Inc., Advanced Computer Communications, January 1993.

[RFC1406] Baker, F., and J. Watt, Editors, "Definitions of Managed Objects for the DS1 and E1 Interface Types", RFC 1406,

Advanced Computer Communications, Newbridge Networks Corporation, January 1993.

[RFC1407] Cox, T., and K. Tesink, "Definitions of Managed Objects for the DS3/E3 Interface Type", RFC 1407, Bell Communications Research, January 1993.

[RFC1414] St. Johns, M., and M. Rose, "Identification MIB", RFC 1414, US Department of Defense, Dover Beach Consulting, Inc., February 1993.

[RFC1461] Throop, D., "SNMP MIB extension for Multiprotocol Interconnect over X.25", RFC 1461, Data General Corporation, May 1993.

[RFC1471] Kastenholz, F., "The Definitions of Managed Objects for the Link Control Protocol of the Point-to-Point Protocol", RFC 1471, FTP Software, Inc., June 1993.

[RFC1472] Kastenholz, F., "The Definitions of Managed Objects for the Security Protocols of the Point-to-Point Protocol", RFC 1472, FTP Software, Inc., June 1993.

[RFC1473] Kastenholz, F., "The Definitions of Managed Objects for the IP Network Control Protocol of the Point-to-Point Protocol", RFC 1473, FTP Software, Inc., June 1993.

[RFC1474] Kastenholz, F., "The Definitions of Managed Objects for the Bridge Network Control Protocol of the Point-to-Point Protocol" RFC 1474, FTP Software, Inc., June 1993.

[RFC1514] Grillo, P., and S. Waldbusser, "Host Resources MIB", RFC 1514, Network Innovations, Intel Corporation, Carnegie Mellon University, September 1993.

[RFC1515] McMaster, D., McCloghrie, K., and S. Roberts, "Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)", RFC 1515, SynOptics Communications, Inc., Hughes LAN Systems, Inc., Farallon Computing, Inc., September 1993.

[RFC1516] McMaster, D., and K. McCloghrie, "Definitions of Managed Objects for IEEE 802.3 Repeater Devices", RFC 1516, SynOptics Communications, Inc., Hughes LAN Systems, Inc., September 1993.

[RFC1559] Saperia, J., "DECnet Phase IV MIB Extensions", RFC 1559, Digital Equipment Corporation, December 1993.

[RFC1565] Kille, S., WG Chair, and N. Freed, Editor, "Network Services Monitoring MIB", RFC 1565, ISODE Consortium and Innosoft, January 1994.

[RFC1566] Kille, S., WG Chair, and N. Freed, Editor, "Mail Monitoring MIB", RFC 1566, ISODE Consortium, Innosoft, January 1994.

[RFC1567] Mansfield, G., and S. Kille, "X.500 Directory Monitoring MIB", RFC 1567, AIC Systems Laboratory, ISODE Consortium, January 1994.

[RFC1573] McCloghrie, K., and F. Kastenholz, "Evolution of the Interfaces Group of MIB-II", RFC 1573, Hughes LAN Systems, FTP Software, January 1994.

[RFC1595] Brown, T., and K. Tesink, Editors, "Definitions of Managed Objects for the SONET/SDH Interface Type", RFC 1595, Bell Communications Research, March 1994.

[RFC1596] Brown, T., Editor, Definitions of Managed Objects for Frame Relay Service", RFC 1596, Bell Communications Research, March 1994.

[RFC1611] Austein, R., and J. Saperia, "DNS Server MIB Extensions", RFC 1611, Epilogue Technology Corporation, Digital Equipment Corporation, May 1994.

[RFC1628] Case, J., Editor, "UPS Management Information Base", RFC 1628, SNMP Research, Incorporated, May 1994.

[RFC1650] Kastenholz, F., "Definitions of Managed Objects for the Ethernet-like Interface Types using SMIv2", RFC 1650, FTP Software, Inc., August 1994.

[RFC1657] Willis, S., Burruss, J., and J. Chu, Editor, "Definitions of Managed Objects for the Fourth Version of the Border Gateway Protocol (BGP-4) using SMIv2", RFC 1657, Wellfleet Communications Inc., IBM Corp., July 1994.

[RFC1658] Stewart, B., "Definitions of Managed Objects for Character Stream Devices using SMIv2", RFC 1658, Xyplex, Inc., July 1994.

[RFC1659] Stewart, B., "Definitions of Managed Objects for RS-232-like Hardware Devices using SMIv2", RFC 1659, Xyplex, Inc., July 1994.

[RFC1660] Stewart, B., "Definitions of Managed Objects for

Parallel-printer-like Hardware Devices using SMIv2", RFC 1660, Xyplex, Inc., July 1994.

[RFC1665] Kielczewski, Z., Kostick, D., and K. Shih, Editors, "Definitions of Managed Objects for SNA NAUs using SMIv2", RFC 1665, Eicon Technology Corporation, Bell Communications Research, Novell, July 1994.

[RFC1694] Brown, T., and K. Tesink, Editors, "Definitions of Managed Objects for SMDS Interfaces using SMIv2", RFC 1694, Bell Communications Research, August 1994.

[RFC1695] Ahmed, M., and K. Tesink, Editors, "Definitions of Managed Objects for ATM Management Version 8.0 using SMIv2", RFC 1695, Bell Communications Research, August 1994.

[RFC1696] Barnes, J., Brown, L., Royston, R., and S. Waldbusser, "Modem Management Information Base (MIB) using SMIv2", RFC 1696, Xylogics, Inc., Motorola, US Robotics, Inc., Carnegie Mellon University, August 1994.

[RFC1697] Brower, D., Editor, Purvy, B., RDBMSMIB Working Group Chair, Daniel, A., Sinykin, M., and J. Smith, "Relational Database Management System (RDBMS) Management Information Base (MIB) using SMIv2", RFC 1697, The ASK Group, INGRES DBMS Development, Oracle Corporation, Informix Software, Inc., Oracle Corporation, August 1994.

PEOPLE

[Rob Austein]

[BCN] B. Clifford Neuman <bcn@isi.edu>

[BS221] Bob Stewart <STEWART@XYPLEX.COM>

[CXB] Caralyn Brown <cbrown%wellfleet.com@talcott.harvard.edu>

[CXD] Chuck Davin <jrd@ptt.lcs.mit.edu>

[CXG] Chris Gunner <gunner@dsmail.lkg.dec.com>

[Dean Throop]

[DXM5] Donna McMaster <mcmaster@synoptics.com>

[DXP1] David Perkins <dperkins@synoptics.com>

[EXD] Eric Decker <cire@cisco.com>

[FB77] Fred Baker <fbaker@acc.com>

[FJK2]

[GS2] Greg Satz <satz@CISCO.COM>

[IANA] IANA <iana@isi.edu>

[JDC20] Jeffrey Case <case@UTKUX1.UTK.EDU>

[JKR1] Joyce K. Reynolds <jkrey@isi.edu>

[JXC] John Cook <cook@chipcom.com>

[JXG1] Jim Greuel <jimg%hpcndpc@hplabs.hp.com>

[JXS2] Jon Saperia <saperia@tcpjon.enet.dec.com>

[Jeff Hilgeman]

[Johannsen]

[KZM] Keith McCloghrie <KZM@HLS.COM>

[LS8] Louis Steinberg <lou@ARAMIS.RUTGERS.EDU>

[MXA1] Masuma Ahmed <mxa@mail.bellcore.com>

[MTR] Marshall Rose <mrose@dbc.mtview.ca.us>

[RAW44] Robert A. Woodburn <WOODY@SPARTA.COM>

[JXC4] John Chu <jychu@watson.ibm.com>

[Ned Freed]

[Deirdre Kostick]

[Joel Gyllenskog] Joel Gyllenskog <jgyllens@hpdmd48.boi.hp.com>

[Robert Purvey] Robert Purvey <bpurvy@us.oracle.com>

[RXF] Richard Fox <rfox@synoptics.com>

[Jon Saperia] Jon Saperia <saperia@tcpjon.enet.dec.com>

[SW159] Steven Willis <swillis@WELLFLEET.COM>

[SXW] Steve Waldbusser <sw01+@andrew.cmu.edu>

[TXB] Tracy Brown <tacox@mail.bellcore.com>

[TXK] Teemu Kurki <grus@funet.fi>

[Hartmut Wittig]

[]

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

PRIVATE ENTERPRISE NUMBERS

SMI Network Management Private Enterprise Codes:

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

This file is

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

Decimal	Name	References
0	Reserved	Joyce K. Reynolds <jkrey@isi.edu>
1	Proteon	John A. Shriver <jas@PROTEON.COM>
2	IBM	Vik Chandra <vc@ralvm6.vnet.ibm.com>
3	CMU	Steve Waldbusser <sw01+@andrew.cmu.edu>
4	Unix	Keith Sklower <sklower@okeeffe.berkeley.edu>
5	ACC	Art Berggreen <art@SALT.ACC.COM>
6	TWG	John Lunny <jlunny@eco.twg.com> (703) 847-4500
7	CAYMAN	Beth Miaoulis beth@cayman.com
8	PSI	Marty Schoffstahl schoff@NISC.NYSER.NET
9	cisco	Greg Satz satz@CISCO.COM
10	NSC	Geof Stone geof@NETWORK.COM
11	HP	R. Dwight Schettler rds%hpcndm@HPLABS.HP.COM
12	Epilogue	Karl Auerbac karl@empirical.com
13	U of Tennessee	Jeffrey Case case@UTKUX1.UTK.EDU
14	BBN	Robert Hinden <hinden@ENG.SUN.COM>
15	Xylogics, Inc.	John R. LoVerso loverso@westford.ccur.com
16	Timeplex	Laura Bridge laura@uunet.UU.NET
17	Canstar	Sanand Patel sanand@HUB.TORONTO.EDU
18	Wellfleet	Caralyn Brown cbrown@wellfleet.com
19	TRW	Jay Frederking jayf@blackhole.ind.TRW.COM
20	MIT	Jon Rochlis jon@ATHENA.MIT.EDU
21	EON	Michael Waters ---none---
22	Spartacus	Yoav Kluger ykluger@HAWK.ULOWELL.EDU
23	Novell	Steve Bostock steveb@novell.com
24	Spider Systems	Peter Reid peter@spider.co.uk
25	NSFNET	Hans-Werner Braun HWB@MCR.UMICH.EDU
26	Hughes LAN Systems	Keith McCloghrie KZM@HLS.COM
27	Intergraph	Guy Streeter guy@guy.bll.ingr.com
28	Interlan	Bruce Taber taber@europa.InterLan.COM
29	Vitalink Communications	
30	Ulana	Bill Anderson wda@MITRE-BEDFORD.ORG
31	NSWC	Stephen Northcutt SNORTHC@RELAY-NSWC.NAVY.MIL
32	Santa Cruz Operation	Keith Reynolds keithr@SCO.COM
33	Xyplex	Bob Stewart STEWART@XYPLEX.COM
34	Cray	Hunaid Engineer hunaid@OPUS.CRAY.COM
35	Bell Northern Research	Glenn Waters gwaters@BNR.CA

36	DEC	Ron Bhanukitsiri	rbhank@DECVAX.DEC.COM
37	Touch	Brad Benson	---none---
38	Network Research Corp.	Bill Versteeg	bvs@NCR.COM
39	Baylor College of Medicine	Stan Barber	SOB@BCM.TMC.EDU
40	NMFECC-LLNL	Steven Hunter	hunter@CCC.MFECC.LLNL.GOV
41	SRI	David Wolfe	ctabka@TSCA.ISTC.SRI.COM
42	Sun Microsystems	Dennis Yaro	yaro@SUN.COM
43	3Com	Jeremy Siegel	jzs@NSD.3Com.COM
44	CMC	Dave Preston	---none---
45	SynOptics	David Perkins	dperkins@synoptics.com
46	Cheyenne Software	Reijane Huai	sibal@CSD2.NYU.EDU
47	Prime Computer	Mike Spina	WIZARD%enr.prime.com@RELAY.CS.NET
48	MCNC/North Carolina	Data Network Ken Whitfield	ken@MCNC.ORG
49	Chipcom	John Cook	cook@chipcom.com
50	Optical Data Systems	Josh Fielk	---none---
51	gated	Jeffrey C. Honig	jch@gated.cornell.edu
52	Cabletron Systems	Roger Dev	---none---
53	Apollo Computers	Jeffrey Buffun	jbuffum@APOLLO.COM
54	DeskTalk Systems, Inc.	David Kaufman	---none---
55	SSDS	Ron Strich	---none---
56	Castle Rock Computing	John Sancho	---none---
57	MIPS Computer Systems	Charles Marker II	marker@MIPS.COM
58	TGV, Inc.	Ken Adelman	Adelman@TGV.COM
59	Silicon Graphics, Inc.	Ronald Jacoby	rj@SGI.COM
60	University of British Columbia	Don McWilliam	mcwillm@CC.UBC.CA
61	Merit	Bill Norton	wbn@MERIT.EDU
62	FiberCom	Eric Rubin	err@FIBERCOM.COM
63	Apple Computer Inc	Jim Hayes	Hayes@APPLE.COM
64	Gandalf	Henry Kaijak	---none---
65	Dartmouth	Philip Koch	Philip.Koch@DARTMOUTH.EDU
66	David Systems	Kathryn de Graaf	degraaf@davidsys.com
67	Reuter	Bob Zaniolo	---none---
68	Cornell	Laurie Collinsworth	ljc1@cornell.edu
69	LMS	L. Michael Sabo	Sabo@DOCKMASTER.NCSC.MIL
70	Locus Computing Corp.	Arthur Salazar	lcc.arthur@SEAS.UCLA.EDU
71	NASA	Steve Schoch	SCHOCH@AMES.ARC.NASA.GOV
72	Retix	Alex Martin	---none---
73	Boeing	Jerry Geisler	---none---
74	AT&T	Rich Bantel	rgb@mtung.att.com
75	Ungermann-Bass	Didier Moretti	---none---
76	Digital Analysis Corporation	Skip Koppenhaver	stubby!skip@uunet.UU.NET
77	LAN Manager	Doug Karl	KARL-D@OSU-20.IRCC.OHIO-STATE.EDU
78	Netlabs	Jonathan Biggar	jon@netlabs.com
79	ICL	Jon Infante	---none---
80	Auspex Systems	Brian A. Ehrmantraut	bae@auspex.com
81	Lannet Company	Efrat Ramati	---none---
82	Network Computing Devices	Dave Mackie	lupine!djm@UUNET.UU.NET

```
 83   Raycom Systems                        Bruce Willins ---none---
 84   Pirelli Focom Ltd.                         Sam Lau  ---none---
 85   Datability Software Systems     Larry Fischer lfischer@dss.com
 86   Network Application Technology           Y.C. Wang  ---none---
 87   LINK (Lokales Informatik-Netz Karlsruhe)
                            Guenther Schreiner snmp-admin@ira.uka.de
 88   NYU                         Bill Russell  russell@cmcl2.NYU.EDU
 89   RND                                Rina Nethaniel   ---none---
 90   InterCon Systems Corporation Amanda Walker AMANDA@INTERCON.COM
 91   Coral Network Corporation      Jason Perreault jason@coral.com
 92   Webster Computer Corporation  Robert R. Elz  kre@munnari.oz.au
 93   Frontier Technologies Corporation
                                     Prakash Ambegaonkar ---none---
 94   Nokia Data Communications              Douglas Egan ---none---
 95   Allen-Bradely Company
                  Bill King abvax!calvin.icd.ab.com!wrk@uunet.UU.NET
 96   CERN
             Jens T. Rasmussen jenst%cernvax.cern.ch@CUNYVM.CUNY.EDU
 97   Sigma Network Systems, Inc.
                                  Ken Virgile signet!ken@xylogics.COM
 98   Emerging Technologies, Inc.
                            Dennis E. Baasch etinc!dennis@uu.psi.com
 99   SNMP Research                 Jeffrey Case  case@UTKUX1.UTK.EDU
100 Ohio State University
                         Shamim Ahmed ahmed@nisca.ircc.ohio-state.edu
101 Ultra Network Technologies Julie Dmytryk
                                    Julie_Dmytryk.MKT@usun.ultra.com
102   Microcom                           Annmarie Freitas ---none---
103   Martin Marietta Astronautic Group    David Rageth DAVE@MMC.COM
104   Micro Technology                Mike Erlinger  mike@lexcel.com
105   Process Software Corporation      Bernie Volz VOLZ@PROCESS.COM
106   Data General Corporation
                            Joanna Karwowska karwowska@dg-rtp.dg.com
107   Bull Company         Anthony Berent berent@rdgeng.enet.dec.com
108   Emulex Corporation                    Jeff Freeman ---none---
109   Warwick University Computing Services
                         Israel Drori raanan@techunix.technion.ac.il
110   Network General Corporation
                               James Davidson ngc!james@uunet.UU.NET
111   Oracle                         John Hanley jhanley@oracle.com
112   Control Data Corporation Nelluri L. Reddy reddy@uc.msc.umn.edu
113   Hughes Aircraft Company           Keith McCloghrie KZM@HLS.COM
114   Synernetics, Inc.                    Jas Parmar jas@synnet.com
115   Mitre                              Bede McCall bede@mitre.org
116   Hitachi, Ltd.                       Hirotaka Usuda ---none---
117   Telebit                       Mark S. Lewis mlewis@telebit.com
118   Salomon Technology Services          Paul Maurer II ---none---
119   NEC Corporation                              Yoshiyuki Akiyama
```

kddlab!ccs.mt.nec.co.jp!y-akiyam@uunet.uu.net
120 Fibermux Michael Sung msung@ccrelay.fibermux.com
121 FTP Software Inc. Stev Knowles stev@vax.ftp.com
122 Sony Takashi Hagiwara Hagiwara@Sm.Sony.Co.Jp
123 Newbridge Networks Corporation James Watt ---none---
124 Racal-Milgo Information Systems Maurice R. Turcotte
mailrus!uflorida!rm1!dnmrt%rmatl@uunet.UU.NET
125 CR SYSTEMS Soren H. Sorensen ---none---
126 DSET Corporation Dan Shia dset!shia@uunet.UU.NET
127 Computone Bill Versteeg bvs@NCR.COM
128 Tektronix, Inc. Dennis Thomas dennist@tektronix.TEK.COM
129 Interactive Systems Corporation
Steve Alexander stevea@i88.isc.com
130 Banyan Systems Inc.
Deepak Taneja eepak=Taneja%Eng%Banyan@Thing.banyan.com
131 Sintrom Datanet Limited
132 Bell Canada Mark Fabbi markf@gpu.utcs.utoronto.ca
133 Crosscomm Corporation Reuben Sivan crossc!rsivan@uunet.UU.NET
134 Rice University Catherine Foulston cathyf@rice.edu
135 T3Plus Networking, Inc. Harley Frazee harley@io.t3plus.com
136 Concurrent Computer Corporation
John R. LoVerso loverso@westford.ccur.com
137 Basser Paul O'Donnell paulod@cs.su.oz.au
138 Luxcom
139 Artel Jon Ziegler Ziegler@Artel.com
140 Independence Technologies, Inc. (ITI)
Gerard Berthet gerard@indetech.com
141 Frontier Software Development Narendra Popat ---none---
142 Digital Computer Limited Osamu Fujiki ---none---
143 Eyring, Inc. Ron Holt ron@Eyring.COM
144 Case Communications Peter Kumik ---none---
145 Penril DataComm, Inc. Keith Hogan keith%penril@uunet.uu.net
146 American Airlines Bill Keatley ---none---
147 Sequent Computer Systems Scott Hahn sdh@sequent.com
148 Bellcore Kaj Tesink kaj@nvuxr.cc.bellcore.com
149 Konkord Communications Ken Jones konkord!ksj@uunet.uu.net
150 University of Washington
Christopher Wheeler cwheeler@cac.washignton.edu
151 Develcon Sheri Mayhew zaphod!sherim@herald.usask.ca
152 Solarix Systems Paul Afshar paul@solar1.portal.com
153 Unifi Communications Corp. Yigal Hochberg yigal@unifi.com
154 Roadnet Dale Shelton ---none---
155 Network Systems Corp.
Nadya K. El-Afandi nadya@khara.network.com
156 ENE (European Network Engineering) Peter Cox ---none---
157 Dansk Data Elektronik A/S Per Bech Hansen pbh@dde.dk
158 Morning Star Technologies Karl Fox karl@MorningStar.Com
159 Dupont EOP Oscar Rodriguez ---none---

160 Legato Systems, Inc. Jon Kepecs kepecs@Legato.COM
161 Motorola SPS Vince Enriquez enriquez@sps.mot.com
162 European Space Agency (ESA)
Eduardo EDUATO%ESOC.BITNET@CUNYVM.CUNY.EDU
163 BIM Bernard Lemercier bl@sunbim.be
164 Rad Data Communications Ltd. Oft Israel ---none---
165 Intellicom Paul Singh ---none---
166 Shiva Corporation Phil Budne phil@Shiva.COM
167 Fujikura America Debbie Reed ---none---
168 Xlnt Designs INC (XDI) Mike Anello mike@xlnt.com
169 Tandem Computers Rex Davis ---none---
170 BICC David A. Brown fzbicdb@uk.ac.ucl
171 D-Link Systems, Inc. Henry P. Nagai ---none---
172 AMP, Inc. Rick Downs ---none---
173 Netlink Mauro Zallocco ---none---
174 C. Itoh Electronics Larry Davis ---none---
175 Sumitomo Electric Industries (SEI)
Kent Tsuno tsuno@sumitomo.com
176 DHL Systems, Inc.
David B. Gurevich dgurevic@rhubarb.ssf-sys.dhl.com
177 Network Equipment Technologies Mark Tom marktom@tom.net.com
178 APTEC Computer Systems Larry Burton ssds!larryb@uunet.UU.NET
179 Schneider & Koch & Co, Datensysteme GmbH Thomas Ruf tom@rsp.de
180 Hill Air Force Base Russell G. Wilson rwilson@oodis01.af.mil
181 ADC Kentrox Bruce Kropp ktxc8!bruce@uunet.UU.NET
182 Japan Radio Co. Nagayuki Kojima nkojima@lab.nihonmusen.co.jp
183 Versitron Matt Harris ---none---
184 Telecommunication Systems Hugh Lockhart ---none---
185 Interphase Gil Widdowson ---none---
186 Toshiba Corporation Mike Asagami toshiba@mothra.nts.uci.edu
187 Clearpoint Research Corp.
188 Ascom Andrew Smith andrew@hasler.ascom.ch
189 Fujitsu America Chung Lam ---none---
190 NetCom Solutions, Inc. Dale Cabell---none---
191 NCR Cheryl Krupczak clefor@secola.columbia.ncr.com
192 Dr. Materna GmbH Torsten Beyer tb@Materna.de
193 Ericsson Business Communications Gunnar Nilsson ---none---
194 Metaphor Computer Systems Paul Rodwick ---none---
195 Patriot Partners Paul Rodwick ---none---
196 The Software Group Limited (TSG)
Ragnar Paulson tsgfred!ragnar@uunet.UU.NET
197 Kalpana, Inc. Anil Bhavnani ---none---
198 University of Waterloo
R. J. White snmp-tech@watmath.waterloo.edu
199 CCL/ITRI
Ming-Perng Chen N100CMP0%TWNITRI1.BITNET@CUNYVM.CUNY.EDU
200 Coeur Postel Professor Kynikos Special Consultant
201 Mitsubish Cable Industries, Ltd. Masahiko Hori ---none---

```
    202   SMC                                   Lance Sprung  ---none---
    203   Crescendo Communication, Inc.         Prem Jain  prem@cres.com
    204   Goodall Software Engineering    Doug Goodall   goodall@crl.com
    205   Intecom                                 Brad Parke  ---none---
    206   Victoria University of Wellington
                                Jonathan Stone jonathan@isor.vuw.ac.nz
    207   Allied Telesis, Inc.
                     Scott Holley SCOTT_CLINTON_HOLLEY@cup.portal.com
    208   Dowty Network Systems A/S         Hartvig Ekner  hj@dowtyns.dk
    209   Protools                                  Glen Arp ---none---
    210   Nippon Telegraph and Telephone Corp.
                  Toshiharu Sugawara sugawara%wink.ntt.jp@RELAY.CS.NET
    211   Fujitsu Limited  Ippei Hayashi hayashi@sysrap.cs.fujitsu.co.jp
    212   Network Peripherals Inc.    Creighton Chong cchong@fastnet.com
    213   Netronix, Inc.                          Jacques Roth ---none---
    214   University of Wisconsin - Madison
                    Dave Windorski DAVID.WINDORSKI@MAIL.ADMIN.WISC.EDU
    215   NetWorth, Inc.                          Craig Scott  ---none---
    216   Tandberg Data A/S          Harald Hoeg haho%huldra.uucp@nac.no
    217   Technically Elite Concepts, Inc.
                           Russell S. Dietz Russell_Dietz@Mcimail.com
    218   Labtam Australia Pty. Ltd.
                            Michael Podhorodecki michael@labtam.oz.au
    219   Republic Telcom Systems, Inc.
                         Steve Harris rtsc!harris@boulder.Colorado.edu
    220   ADI Systems, Inc.                         Paul Liu ---none---
    221   Microwave Bypass Systems, Inc.            Tad Artis  ---none---
    222   Pyramid Technology Corp.          Richard Rein rein@pyramid.com
    223   Unisys_Corp                            Lawrence Brow ---none---
    224   LANOPTICS LTD., Israel
                           Israel Drori raanan@techunix.technion.ac.il
    225   NKK Corporation                          J. Yoshida  ---none---
    226   MTrade UK Ltd.                       Peter Delchiappo ---none---
    227   Acals                     Patrick Cheng pcheng@dill.ind.trw.com
    228   ASTEC, Inc.                       Hiroshi Fujii fujii@astec.co.jp
    229   Delmarva Power       John K. Scoggin, Jr. scoggin@delmarva.com
    230   Telematics International, Inc.          Kevin Smith ---none---
    231   Siemens Nixdorf Informations Syteme AG
                                          Gunther Kroenert ---none---
    232   Compaq
    233   NetManage, Inc.          William Dunn netmanage@cup.portal.com
    234   NCSU Computing Center        David Joyner david@unity.ncsu.edu
    235   Empirical Tools and Technologies
                                    Karl Auerbach karl@empirical.com
    236   Samsung Group                   Hong K. Paik paik@samsung.com
    237   Takaoka Electric Mfg. Co., Ltd.
               Hidekazu Hagiwara hagiwara@takaoka.takaoka-electric.co.jp
    238   Netrix Systems Corporation        Eldon S. Mast esm@netrix.com
```

```
    239   WINDATA                                Bob Rosenbaum ---none---
    240   RC International A/S                 Carl H. Dreyer chd@rci.dk
    241   Netexp Research                       Henk Boetzkes ---none---
    242   Internode Systems Pty Ltd
                              Simon Hackett simon@ucs.adelaide.edu.au
    243   netCS Informationstechnik GmbH
                               Oliver Korfmacher okorf@bunt.netcs.com
    244   Lantronix                 Rich Lyman  rich@alecto.gordian.com
    245   Avatar Consultants
                    Kory Hamzeh ames!avatar.com!kory@harvard.harvard.edu
    246   Furukawa Electoric Co. Ltd.
             Shoji Fukutomi kddlab!polo.furukawa.co.jp!fuku@uunet.UU.NET
    247   AEG Electrcom                            R. Nurnberg ---none---
    248   Richard Hirschmann GmbH & Co.
                           Heinz Nisi mia@intsun.rus.uni-stuttgart.de
    249   G2R Inc.                               Khalid Hireche ---none---
    250   University of Michigan
                          Tim Howes Tim.Howes@terminator.cc.umich.edu
    251   Netcomm, Ltd.                      W.R. Maynard-Smith ---none---
    252   Sable Technology Corporation         Rodney Thayer  ---none---
    253   Xerox               Edwards E. Reed ipcontact.cin_ops@xerox.com
    254   Conware Computer Consulting GmbH
                                     Michael Sapich sapich@conware.de
    255   Compatible Systems Corp.         John Gawf  gawf@compatible.com
    256   Scitec Communications Systems Ltd.    Stephen Lewis ---none---
    257   Transarc Corporation        Pat Barron Pat_Barron@TRANSARC.COM
    258   Matsushita Electric Industrial Co., Ltd.
                                      Nob Mizuno mizuno@isl.mei.co.jp
    259   ACCTON Technology                        Don Rooney ---none---
    260   Star-Tek, Inc.                    Carl Madison carl@startek.com
    261   Codenoll Tech. Corp.                     Dan Willie ---none---
    262   Formation, Inc.                        Carl Marcinik ---none---
    263   Seiko Instruments, Inc. (SII)    Yasuyoshi Watanabe ---none---
    264   RCE (Reseaux de Communication d'Entreprise S.A.)
                                Etienne Baudras-Chardigny  ---none---
    265   Xenocom, Inc.                Sean Welch welch@raven.ulowell.edu
    266   KABELRHEYDT                        Hubert Theissen ---none---
    267   Systech Computer Corporation
                              Brian Petry systech!bpetry@uunet.UU.NET
    268   Visual                            Brian O'Shea bos@visual.com
    269   SDD (Scandinavian Airlines Data Denmark A/S)
                                                Per Futtrup ---none---
    270   Zenith Electronics Corporation            David Lin ---none---
    271   TELECOM FINLAND                        Petri Jokela ---none---
    272   BinTec Computersystems                Marc Sheldon ms@BinTec.DE
    273   EUnet Germany                    Marc Sheldon ms@Germany.EU.net
    274   PictureTel Corporation               Oliver Jones oj@pictel.com
    275   Michigan State University             Lih-Er Wey WEYLE@msu.edu
```

```
    276   GTE Telecom Incorporated              Grant Gifford ---none---
    277   Cascade Communications Corp.
                                  Chikong Shue alpo!chi@uunet.uu.net
    278   Hitachi Cable, Ltd.                    Takahiro Asai ---none---
    279   Olivetti                  Marco Framba  framba@orc.olivetti.com
    280   Vitacom Corporation          Parag Rastogi parag@cup.portal.com
    281   INMOS                          Graham Hudspith  gwh@inmos.co.uk
    282   AIC Systems Laboratories Ltd.  Glenn Mansfield glenn@aic.co.jp
    283   Cameo Communications, Inc.                Alan Brind ---none---
    284   Diab Data AB                         Mats Lindstrom mli@diab.se
    285   Olicom A/S                          Lars Povlsen krus@olicom.dk
    286   Digital-Kienzle Computersystems    Hans Jurgen Dorr ---none---
    287   CSELT(Centro Studi E Laboratori Telecomunicazioni)
                               Paolo Coppo coppo@cz8700.cselt.stet.it
    288   Electronic Data Systems     Mark Holobach holobach@tis.eds.com
    289   McData Corporation      Glenn Levitt gpl0363@mcmail.mcdata.com
    290   Harris Corporation       David Rhein davidr@ssd.csd.harris.com
    291   Technology Dynamics, Inc. Chip Standifer TDYNAMICS@MCIMAIL.COM
    292   DATAHOUSE Information Systems Ltd.          Kim Le ---none---
    293   DSIR Network Group  Tony van der Peet srghtvp@grv.dsir.govt.nz
    294   Texas Instruments      Blair Sanders Blair_Sanders@mcimail.com
    295   PlainTree Systems Inc.     Paul Chefurka chefurka@plntree.UUCP
    296   Hedemann Software Development
                            Stefan Hedemann 100015.2504@compuserve.com
    297   Fuji Xerox Co., Ltd.                              Hiroshi Kume
                  Kume%KSPB%Fuji_Xerox@tcpgw.netg.ksp.fujixerox.co.jp
    298   Asante Technology                    Hsiang Ming Ma ---none---
    299   Stanford University
                          RL "Bob" Morgan morgan@jessica.stanford.edu
    300   Digital Link                            Jimmy Tu  jimmy@dl.com
    301   Raylan Corporation            Mark S. Lewis mlewis@telebit.com
    302   Datacraft                         Alan Lloyd alan@datacraft.oz
    303   Hughes                            Keith McCloghrie KZM@HLS.COM
    304   Farallon Computing, Inc.             Steven Sweeney ---none---
    305   GE Information Services              Steve Bush sfb@ncoast.org
    306   Gambit Computer Communications         Zohar Seigal ---none---
    307   Livingston Enterprises, Inc.
                                  Steve Willens steve@livingston.com
    308   Star Technologies                      Jim Miner miner@star.com
    309   Micronics Computers Inc.         Darren Croke dc@micronics.com
    310   Basis, Inc.                     Heidi Stettner heidi@mtxinu.COM
    311   Microsoft                John M. Ballard jballard@microsoft.com
    312   US West Advance Technologies
                               Donna Hopkins dmhopki@uswat.uswest.com
    313   University College London Shaw C. Chuang S.Chuang@cs.ucl.ac.uk
    314   Eastman Kodak Company   W. James Colosky wjc@tornado.kodak.com
    315   Network Resources Corporation       Kathy Weninger  ---none---
    316   Atlas Telecom             Bruce Kropp ktxc8!bruce@uunet.UU.NET
```

317 Bridgeway Umberto Vizcaino ---none---
318 American Power Conversion Corp.
Peter C. Yoest apc!yoest@uunet.uu.net
319 DOE Atmospheric Radiation Measurement Project
Paul Krystosek krystosk@eid.anl.gov
320 VerSteeg CodeWorks Bill Versteeg bvs@NCR.COM
321 Verilink Corp Bill Versteeg bvs@NCR.COM
322 Sybus Corportation Mark T. Dauscher mdauscher@sybus.com
323 Tekelec Bob Grady ---none---
324 NASA Ames Research Cente Nick Cuccia cuccia@nas.nasa.gov
325 Simon Fraser University Robert Urquhart quipu@sfu.ca
326 Fore Systems, Inc. Eric Cooper ecc@fore.com
327 Centrum Communications, Inc. Vince Liu ---none---
328 NeXT Computer, Inc.
Lennart Lovstrand Lennart_Lovstrand@NeXT.COM
329 Netcore, Inc. Skip Morton ---none---
330 Northwest Digital Systems Brian Dockter ---none---
331 Andrew Corporation Ted Tran ---none---
332 DigiBoard Dror Kessler dror@digibd.com
333 Computer Network Technology Corp. Bob Meierhofer ---none---
334 Lotus Development Corp. Bill Flanagan bflanagan@lotus.com
335 MICOM Communication Corporation
Donna Beatty SYSAD@prime.micom.com
336 ASCII Corporation Toshiharu Ohno tony-o@ascii.co.jp
337 PUREDATA Research Tony Baxter tony@puredata.com
338 NTT DATA Yasuhiro Kohata kohata@rd.nttdata.jp
339 Empros Systems International David Taylor dtaylor@ems.cdc.ca
340 Kendall Square Research (KSR) Dave Hudson tdh@uunet.UU.NET
341 Martin Marietta Energy Systems Gary Haney haneyg@ornl.gov
342 Network Innovations Pete Grillo pl0143@mail.psi.net
343 Intel Corporation Brady Orand borand@pcocd2.intel.com
344 Proxar Ching-Fa Hwang cfh@proxar.com
345 Epson Research Center Richard Schneider rschneid@epson.com
346 Fibernet George Sandoval ---none---
347 Box Hill Systems Corporation Tim Jones tim@boxhill.com
348 American Express Travel Related Services
Jeff Carton jcarton@amex-trs.com
349 Compu-Shack Tomas Vocetka OPLER%CSEARN.bitnet@CUNYVM.CUNY.EDU
350 Parallan Computer, Inc. Charles Dulin ---none---
351 Stratacom Clyde Iwamoto cki@strata.com
352 Open Networks Engineering, Inc. Russ Blaesing rrb@one.com
353 ATM Forum Keith McCloghrie KZM@HLS.COM
354 SSD Management, Inc. Bill Rose ---none---
355 Automated Network Management, Inc. Carl Vanderbeek ---none--
356 Magnalink Communications Corporation
David E. Kaufman ---none---
357 TIL Systems, Ltd. Garry McCracken ---none---
358 Skyline Technology, Inc. Don Weir ---none---

```
    359   Nu-Mega Technologies, Inc.              Dirk Smith  ---none---
    360   Morgan Stanley & Co. Inc.
                              Victor Kazdoba vsk@katana.is.morgan.com
    361   Integrated Business Network            Michael Bell ---none---
    362   L & N Technologies, Ltd.               Steve Loring ---none---
    363   Cincinnati Bell Information Systems, Inc.
                                    Deron Meranda dmeranda@cbis.COM
    364   OSCOM International
                          Farhad Fozdar f_fozdar@fennel.cc.uwa.edu.au
    365   MICROGNOSIS                Paul Andon pandon@micrognosis.co.uk
    366   Datapoint Corporation     Lee Ziegenhals lcz@sat.datapoint.com
    367   RICOH Co. Ltd.
                 Toshio Watanabe watanabe@godzilla.rsc.spdd.ricoh.co.jp
    368   Axis Communications AB              Martin Gren martin@axis.se
    369   Pacer Software               Wayne Tackabury wft@pacersoft.com
    370   Axon Networks Inc.            Robin Iddon axon@cix.clink.co.uk
    371   Brixton Systems, Inc.       Peter S. Easton easton@brixton.com
    372   GSI                    Etienne Demailly etienne.demailly@gsi.fr
    373   Tatung Co., Ltd.
                 Chih-Yi Chen TCCISM1%TWNTTIT.BITNET@pucc.Princeton.EDU
    374   DIS Research LTD.                  Ray Compton rayc@command.com
    375   Quotron Systems, Inc.
                             Richard P. Stubbs richard@atd.quotron.com
    376   Dassault Electronique
                             Olivier J. Caleff caleff@dassault-elec.fr
    377   Corollary, Inc.               James L. Gula gula@corollary.com
    378   SEEL, Ltd.                              Ken Ritchie ---none---
    379   Lexcel                            Mike Erlinger mike@lexcel.com
    380   Sophisticated Technologies, Inc.
                              Bill Parducci 70262.1267@compuserve.com
    381   OST                                           A. Pele ---none---
    382   Megadata Pty Ltd.      Andrew McRae andrew@megadata.mega.oz.au
    383   LLNL Livermore Computer Center
                             Dan Nessett nessett@ocfmail.ocf.llnl.gov
    384   Dynatech Communications  Graham Welling s8000!gcw@uunet.uu.net
    385   Symplex Communications Corp.             Cyrus Azar ---none---
    386   Tribe Computer Works               Ken Fujimoto fuji@tribe.com
    387   Taligent, Inc.            Lorenzo Aguilar lorenzo@taligent.com
    388   Symbol Technologies, Inc.
                    John Kramer +1-408-369-2679 jkramer@psd.symbol.com
    389   Lancert                                 Mark Hankin ---none---
    390   Alantec                          Paul V. Fries pvf@alantec.com
    391   Ridgeback Solutions
                         Errol Ginsberg bacchus!zulu!errol@uu2.psi.com
    392   Metrix, Inc.                 D. Venkatrangan venkat@metrix.com
    393   Excutive Systems/XTree Company
                                    Dale Cabell cabell@smtp.xtree.com
    394   NRL Communication Systems Branch
```

R. K. Nair nair@itd.nrl.navy.mil
395 I.D.E. Corporation Rob Spade ---none---
396 Matsushita Electric Works, Ltd.
Claude Huss claude@trc.mew.mei.co.jp
397 MegaPAC Ian George ---none---
398 Pilkington Communication Systems Dave Atkinson ---none---
399 Hitachi Computer Products (America), Inc.
Masha Golosovker masha@hicomb.hi.com
400 METEO FRANCE Remy Giraud Remy.Giraud@meteo.fr
401 PRC Inc. Jim Noble noble_jim@prc.com
402 Wal*Mart Stores, Inc. Mike Fitzgerel mlfitzg@wal-mart.com
403 Nissin Electric Company, Ltd. Aki Komatsuzaki (408) 737-0274
404 Distributed Support Information Standard
Mike Migliano <mike@uwm.edu>
405 SMDS Interest Group (SIG)
Elysia C. Tan <ecmt1@sword.bellcore.com>
406 SolCom Systems Ltd. Hugh Evans 0506 873855
407 Bell Atlantic Colin deSa socrates!bm5ld15@bagout.BELL-ATL.COM
408 Advanced Multiuser Technologies Corporation
409 Mitsubishi Electric Corporation
Yoshitaka Ogawa <ogawa@nkai.cow.melco.co.jp>
410 C.O.L. Systems, Inc. Frank Castellucci (914) 277-4312
411 University of Auckland
Nevil Brownlee < n.brownlee@aukuni.ac.nz>
412 Desktop Management Task Force (DMTF)
Dave Perkins <dperkins@synoptics.com>
413 Klever Computers, Inc. Tom Su 408-735-7723 kci@netcom.com
414 Amdahl Corporation Steve Young sy@uts.admahl.com
415 JTEC Pty, Ltd. Jan Bartel (02) 809 6933
416 Matra Communcation Hong-Loc Nguyen (33.1) 34.60.85.25
417 HAL Computer Systems Michael A. Petonic petonic@hal.com
418 Lawrence Berkeley Laboratory Russ Wright wright@lbl.gov
419 Dale Computer Corporation Dean Craven 1-800-336-7483
420 IPTC, Universitaet of Tuebingen
Andreas J. Haug <ahaug@mailserv.zdv.uni-tuebingen.de>
421 Bytex Corporation
Mary Ann Burt <bytex!ws054!maryann@uunet.UU.NET>
422 Cogwheel, Inc. Brian Ellis bri@Cogwheel.COM
423 Lanwan Technologies Thomas Liu (408) 986-8899
424 Thomas-Conrad Corporation Karen Boyd 512-836-1935
425 TxPort Bill VerSteeg bvs@ver.com
426 Compex, Inc. Andrew Corlett BDA@ORION.OAC.UCI.EDU
427 Evergreen Systems, Inc. Bill Grace (415) 897-8888
428 HNV, Inc. James R. Simons jrs@denver.ssds.COM
429 U.S. Robotics, Inc. Chris Rozman chrisr@usr.com
430 Canada Post Corporation Walter Brown +1 613 722-8843
431 Open Systems Solutions, Inc. David Ko davidk@ossi.com
432 Toronto Stock Exchange Paul Kwan (416) 947-4284

433 MamakosTransSys Consulting
Louis A. Mamakos louie@transsys.com
434 EICON Vartan Narikian vartan@eicon.qc.ca
435 Jupiter Systems Russell Leefer rml@jupiter.com
436 SSTI Philip Calas (33) 61 44 19 51
437 Grand Junction Networks Randy Ryals randyr@grandjunction.com
438 Anasazi, Inc. Chad Larson (chad@anasazi.com)
439 Edward D. Jones and Company John Caruso (314) 851-3422
440 Amnet, Inc. Richard Mak mak@amnet.COM
441 Chase Research Kevin Gage ---none---
442 PEER Networks Randy Presuhn randy@peer.com
443 Gateway Communications, Inc. Ed Fudurich ---none---
444 Peregrine Systems Eric Olinger eric@peregrine.com
445 Daewoo Telecom SeeYoung Oh oco@scorpio.dwt.co.kr
446 Norwegian Telecom Research Paul Hoff paalh@brage.nta.no
447 WilTel Anil Prasad anil_prasad@wiltel.com
448 Ericsson-Camtec Satish Popat ---none---
449 Codex Thomas McGinty ---none---
450 Basis Heidi Stettner heidi@mtxinu.COM
451 AGE Logic Syd Logan syd@age.com
452 INDE Electronics Gordon Day gday@inde.ubc.ca
453 ISODE Consortium Steve Kille S.Kille@isode.com
454 J.I. Case Mike Oswald mike@helios.uwsp.edu
455 Trillium Jeff Lawrence j_lawrence@trillium.com
456 Bacchus Inc. Errol Ginsberg bacchus!zulu!errol@uu2.psi.com
457 MCC Doug Rosenthal rosenthal@mcc.com
458 Stratus Computer Dave Snay dks@sw.stratus.com
459 Quotron Richard P. Stubbs richard@atd.quotron.com
460 Beame & Whiteside Carl Beame beame@ns.bws.com
461 Cellular Technical Services Greg Hummel ---none---
462 Shore Microsystems, Inc. Gordon Elam (309) 229-3009
463 Telecommunications Techniques Corp. Tom Nisbet nisbet@tt.com
464 DNPAP (Technical University Delft)
Jan van Oorschot <bJan.vOorschot@dnpap.et.tudelft.nl>
465 Plexcom, Inc. Bruce Miller (805) 522-3333
466 Tylink Stavros Mohlulis (508) 285-0033
467 Brookhaven National Laboratory
Dave Stampf drs@bach.ccd.bnl.gov
468 Computer Communication Systems
Gerard Laborde <Gerard.Laborde@sp1.y-net.fr>
469 Norand Corp. Rose Gorrell 319-269-3100
470 MUX-LAP Philippe Labrosse 514-735-2741
471 Premisys Communications, Inc
Mike MacFaden <premisys!mike@fernwood.mpk.ca.us>
472 Bell South Telecommunications Johnny Walker 205-988-7105
473 J. Stainsbury PLC Steve Parker 44-71-921-7550
474 Ki Research Inc Toni Barckley 410-290-0355x220
475 Wandel and Goltermann Technologies

David Walters 919-941-5730x4203 <walter@wg.com>
476 Emerson Computer Power
Roger Draper 714-457-3638 rdraper@cerf.net
477 Network Software Associates Jeffery Chiao 714-768-4013
478 Procter and Gamble Peter Marshall 513-983-1100x5988
479 Meridian Technology Corporation
Kenneth B. Denson <kdenson@magic.meridiantc.com>
480 QMS, Inc. Bill Lott lott@imagen.com
481 Network Express Tom Jarema 313-761-5051 ITOH@MSEN.COM
482 LANcity Corporation Pam Yassini pam@lancity.com
483 Dayna Communications, Inc.
Sanchaita Datta datta@signus.utah.edu
484 kn-X Ltd. Sam Lau 44 943 467007
485 Sync Research, Inc. Alan Bartky (714) 588-2070
486 PremNet Ken Huang HuangK@rimail.interlan.com
487 SIAC Peter Ripp (212) 383-9061
488 New York Stock Exchange Peter Ripp (212) 383-9061
489 American Stock Exchange Peter Ripp (212) 383-9061
490 FCR Software, Inc. Brad Parker brad@fcr.com
491 National Medical Care, Inc. Robert Phelan (617) 466-9850
492 Dialogue Communication Systemes, S.A.
Klaus Handke +(49) 30 802 24 97
493 NorTele Bjorn Kvile +47 2 48 89 90
494 Madge Networks, Inc.
Duncan Greatwood dgreatwo@madge.mhs.compuserve.com
495 Memotec Communications Graham Higgins ghiggins@teleglobe.com
496 CTON Nick Hennenfent nicholas@cton.com
497 Leap Technology, Inc. George Economou george@leap.com
498 General DataComm, Inc. William Meltzer meltzer@gdc.com
499 ACE Communications, Ltd. Danny On 972-3-570-1423
500 Automatic Data Processing (ADP) Alex Rosin (201) 714-3982
501 Programa SPRITEL Alberto Martinez
Martinez_Alberto_SPRITEL@euskom.spritel.es
502 Adacom Aial Haorch 972-4-899-899
503 Metrodata Ltd Nick Brown 100022.767@compuserve.com
504 Ellemtel Telecommunication Systems Laboratories
Richard G Bruvik Richard.Bruvik@eua.ericsson.se
505 Arizona Public Service Duane Booher DBOOHER@APSC.COM
506 NETWIZ, Ltd., Emanuel Wind eumzvir@techunix.technion.ac.il
507 Science and Engineering Research Council (SERC) Paul Kummer
P.Kummer@daresbury.ac.uk
508 The First Boston Corporation Kevin Chou
csfb1!dbadmin4!kchou@uunet.UU.NET
509 Hadax Electronics Inc. Marian Kramarczyk
73477.2731@compuserve.com
510 VTKK Markku Lamminluoto lamminluoto@vtkes1.vtkk.fi
511 North Hills Israel Ltd. Carmi Cohen carmi@north.hellnet.org
512 TECSIEL R. Burlon sr@teculx.tecsiel.it

513 Bayerische Motoren Werke (BMW) AG Michael Connolly
mconnolly@net.bmw.de
514 CNET Technologies Nelson Su 408-954-8000
515 MCI Kurt Robohm krobohm@mcimail.com
516 Human Engineering AG (HEAG) Urs Brunner
ubrunner@clients.switch.ch
517 FileNet Corporation Joe Raby raby@filenet.com
518 NFT-Ericsson Kjetil Donasen +47 2 84 24 00
519 Dun & Bradstreet Vic Smagovic 908-464-2079
520 Intercomputer Communications Brian Kean 513-745-0500x244
521 Defense Intelligence Agency
Barry Atkinson DIA-DMS@DDN-CONUS.DDN.MIL
522 Telesystems SLW Inc. Joe Magony 416-441-9966
523 APT Communications David Kloper 301-831-1182
524 Delta Airlines Jim Guy 404-715-2948
525 California Microwave Kevin Braun 408-720-6520
526 Avid Technology Inc Steve Olynyk 508-640-3328
527 Integro Advanced Computer Systems
Pascal Turbiez +33-20-08-00-40
528 RPTI Chris Shin 886-2-918-3006
529 Ascend Communications Inc. Marc Hyman 510-769-6001
530 Eden Computer Systems Inc. Louis Brando 305-591-7752
531 Kawasaki-Steel Corp
Tomoo Watanabe nrd@info.kawasaki-steel.co.jp
532 Barclays Malcolm Houghton +44 202 671 212
533 B.U.G., Inc. Isao Tateishi tateishi@bug.co.jp
534 Exide Electronics Brian Hammill hamill@dolphin.exide.com
535 Superconducting Supercollider Lab.
Carl W. Kalbfleisch cwk@irrational.ssc.gov
536 Triticom Jim Bales (612) 937-0772
537 Universal Instruments Corp.
Tom Dinnel BA06791%BINGVAXA.bitnet@CUNYVM.CUNY.EDU
538 Information Resources, Inc. Jeff Gear jjg@infores.com
539 Applied Innovation, Inc. Dean Dayton dean@aicorp.cmhnet.org
540 Crypto AG Roland Luthi luthi@iis.ethz.ch
541 Infinite Networks, Ltd. Sean Harding +44 923 710 277
542 Rabbit Software Bill Kwan kwan@rabbit.com
543 Apertus Technologies Stuart Stanley stuarts@apertus.com
544 Equinox Systems, Inc. Monty Norwood 1-800-275-3500 x293
545 Hayes Microcomputer Products
Chris Roussel hayes!hayes.com!croussel@uunet.UU.NET
546 Empire Technologies Inc. Cheryl Krupczak cheryl@cc.gatech.edu
547 Glaxochem, Ltd. Andy Wilson 0229 52261547
548 KPY Network Partners, Corp.
Gordon Vickers sccs@pizza.netcom.com
549 Agent Technology, Inc. Ibi Dhilla idhilla@genesis.nred.ma.us
550 Dornier GMBH Arens Heinrech 49-7545-8 ext 9337
551 Telxon Corporation Frank Ciotti frankc@teleng.telxon.com

552 Entergy Corporation Louis Cureau 504-364-7630
553 Garrett Communications Inc. Igor Khasin (408) 980-9752
554 Agile Networks, Inc. Dave Donegan ddonegan@agile.com
555 Larscom Sameer Jayakar 415-969-7572
556 Stock Equipment Karl Klebenow 216-543-6000
557 ITT Corporation Kevin M. McCauley kmm@vaxf.acdnj.itt.com
558 Universal Data Systems, Inc.
Howard Cunningham 70400.3671@compuserve.com
559 Sonix Communications, Ltd. David Webster +44 285 641 651
560 Paul Freeman Associates, Inc.
Pete Wilson pwilson@world.std.com
561 John S. Barnes, Corp. Michael Lynch 704-878-4107
562 Northern Telecom, Ltd.
Glenn Waters 613-763-3933 <gwaters@bnr.ca>
563 CAP Debris Patrick Preuss ppr@lfs.hamburg.cap-debris.de
564 Telco Systems NAC Harry Hirani Harry@telco-nac.com
565 Tosco Refining Co Fred Sanderson 510-602-4358
566 Russell Info Sys Atul Desai 714-362-4040
567 University of Salford Richard Letts R.J.Letts@salford.ac.uk
568 NetQuest Corp. Jerry Jacobus netquest@tigger.jvnc.net
569 Armon Networking Ltd. Yigal Jacoby yigal@armon.hellnet.org
570 IA Corporation Didier Fort Didier.Fort@lia.com
571 AU-System Communicaton AB Torbjorn Ryding 8-7267572
572 GoldStar Information & Communications, Ltd.
Soo N. Kim ksn@giconet.gsic.co.kr
573 SECTRA AB Tommy Pedersen tcp@sectra.se
574 ONEAC Corporation Bill Elliot ONEACWRE@AOL.COM
575 Tree Technologies Michael Demjanenko (716) 688-4640
576 GTE Government Systems Henry Hernandez (617) 455-2942
577 Denmac Systems, Inc. Andy Denenberg (708) 291-7760
578 Interlink Computer Sciences, Inc.
Mike Mazurek mfm@interlink.com
579 Bridge Information Systems, Inc. Stephen Harvey (314) 567-8482
580 Leeds and Northrup Australia (LNA) Nigel Cook nigelc@lna.oz.au
581 BHA Computer David Hislop rob@bha.oz.au
582 Newport Systems Solutions, Inc.
Pauline Chen paulinec@netcom.com
583 Atrium Technologies Narender Reddy Vangati vnr@atrium.com
584 ROBOTIKER Maribel Narganes maribel@teletek.es
585 PeerLogic Inc. Ratinder Ahuja ratinder@peerlogic.com
586 Digital Transmittion Systems Bill VerSteeg bvs@ver.com
587 Far Point Communications Bill VerSteeg bvs@ver.com
588 Xircom Bill VerSteeg bvs@ver.com
589 Mead Data Central Stephanie Bowman steph@meaddata.com
590 Royal Bank of Canada N. Lim (416) 348-5197
591 Advantis, Inc. Janet Brehm 813 878-4298
592 Chemical Banking Corp. Paul McDonnell pmcdonnl@world.std.com
593 Eagle Technology Ted Haynes (408) 441-4043

```
    594   British Telecom              Ray Smyth  rsmyth@bfsec.bt.co.uk
    595   Radix BV                   P. Groenendaal  project2@radix.nl
    596   TAINET Communication System Corp.
                                  Joseph Chen  +886-2-6583000 (R.O.C.)
    597   Comtek Services Inc.             Steve Harris  (703) 506-9556
    598   Fair Issac   Steve Pasadis  apple.com!fico!sxp  (415) 472-2211
    599   AST Research Inc.                    Bob Beard  bobb@ast.com
    600   Soft*Star s.r.l. Ing. Enrico Badella softstar@pol88a.polito.it
    601   Bancomm                           Joe Fontes  jwf@bancomm.com
    602   Trusted Information Systems, Inc.
                                    James M. Galvin  galvin@tis.com
    603   Harris & Jeffries, Inc.         Deepak Shahane  hjinc@CERF.NET
    604   Axel Technology Corp.               Henry Ngai  (714) 455-1688
    605   GN Navtel, Inc.                   Joe Magony  416-479-8090
    606   CAP debis                    Patrick Preuss  +49 40 527 28 366
    607   Lachman Technology, Inc.  Steve Alexander   stevea@lachman.com
    608   Galcom Networking Ltd.
                          Zeev Greenblatt  galnet@vax.trendline.co.il
    609   BAZIS                             M. van Luijt  martin@bazis.nl
    610   SYNAPTEL                        Eric Remond  remond@synaptel.fr
    611   Investment Management Services, Inc.
                             J. Laurens Troost  rens@stimpys.imsi.com
    612   Taiwan Telecommunication Lab
              Dennis Tseng   LOUIS%TWNMOCTL.BITNET@pucc.Princeton.EDU
    613   Anagram Corporation        Michael Demjanenko   (716) 688-4640
    614   Univel                      John Nunneley  jnunnele@univel.com
    615   University of California, San Diego
                                    Arthur Bierer   abierer@ucsd.edu
    616   CompuServe   Ed Isaacs, Brian Biggs  SYSADM@csi.compuserve.com
    617   Telstra - OTC Australia
                Peter Hanselmann    peterhan@turin.research.otc.com.au
    618   Westinghouse Electric Corp.
                             Ananth Kupanna   ananth@access.digex.com
    619   DGA Ltd.                 Tom L. Willis  twillis@pintu.demon.co.uk
    620   Elegant Communications Inc.
                               Robert Story  Robert.Story@Elegant.COM
    621   Experdata                  Claude Lubin  clubin@expdat.gna.org
    622   Unisource Business Networks Sweden AB
                                             Goran Sterner gsr@tip.net
    623   Molex, Inc.                     Steven Joffe  molex@mcimail.com
    624   Quay Financial Software             Mick Fleming  mickf@quay.ie
    625   VMX Inc.                      Joga Ryali  joga@vmxi.cerfnet.com
    626   Hypercom, Inc.                   Noor Chowdhury  (602) 548-2113
    627   University of Guelph   Kent Percival  Percival@CCS.UoGuelph.CA
    628   DIaLOGIKa                  Juergen Jungfleisch  0 68 97 9 35-0
    629   NBASE Switch Communication
                          Sergiu Rotenstein  75250.1477@compuserve.com
    630   Anchor Datacomm B.V.      Erik Snoek  sdrierik@diamond.sara.nl
```

631 PACDATA John Reed johnr@hagar.pacdata.com
632 University of Colorado Evi Nemeth evi@cs.colorado.edu
633 Tricom Communications Limited
Robert Barrett 0005114429@mcimail.com
634 Santix Software GmbH
Michael Santifaller santi%mozart@santix.guug.de
635 FastComm Communications Corp.
Bill Flanagan 70632.1446@compuserve.com
636 The Georgia Institute of Technology
Michael Mealling michael.mealling@oit.gatech.edu
637 Alcatel Data Networks
Douglas E. Johnson doug.e.johnson@adn.sprint.com
638 GTECH Brian Ruptash bar@gtech.com
639 UNOCAL Corporation Peter Ho ho@unocal.com
640 First Pacific Network Randy Hamilton 408-703-2763
641 Lexmark International Don Wright don@lexmark.com
642 Qnix Computer Sang Weon, Yoo swyoo@qns.qnix.co.kr
643 Jigsaw Software Concepts (Pty) Ltd.
Willem van Biljon wvb@itu2.sun.ac.za
644 VIR, Inc. Mark Cotton (215) 364-7955
645 SFA Datacomm Inc. Don Lechthaler lech@world.std.com
646 SEIKO Telecommunication Systems, Inc.
Lyn T. Robertson (503) 526-5638
647 Unified Management Andy Barnhouse (612) 561-4944
648 RADLINX Ltd. Ady Lifshes ady%rndi@uunet.uu.net
649 Microplex Systems Ltd. Henry Lee hyl@microplex.com
650 Objecta Elektronik & Data AB Johan Finnved jf@objecta.se
651 Phoenix Microsystems Bill VerSteeg bvs@ver.com
652 Distributed Systems International, Inc.
Ron Mackey rem@dsiinc.com
653 Evolving Systems, Inc. Judith C. Bettinger judy@evolving.com
654 SAT GmbH Walter Eichelburg 100063.74@compuserve.com
655 CeLAN Technology, Inc. Mark Liu 886--35-772780
656 Landmark Systems Corp.
Steve Sonnenberg steves@socrates.umd.edu
657 Netone Systems Co., Ltd.
YongKui Shao syk@new-news.netone.co.jp
658 Loral Data Systems Jeff Price jprice@cps070.lds.loral.com
659 Cellware Broadband Technology Michael Roth mike@cellware.de
660 Mu-Systems Gaylord Miyata miyata@world.std.com
661 IMC Networks Corp. Jerry Roby (714) 724-1070
662 Octel Communications Corp. Alan Newman (408) 321-5182
663 RIT Technologies LTD. Ghiora Drori drori@dcl.hellnet.org
664 Adtran Jeff Wells 205-971-8000
665 PowerPlay Technologies, Inc. Ray Caruso rayman@csn.org
666 Oki Electric Industry Co., Ltd.
Shigeru Urushibara uru@cs1.cs.oki.co.jp
667 Specialix International Jeremy Rolls jeremyr@specialix.co.uk

668 INESC (Instituto de Engenharia de Sistemas e Computadores)
Pedro Ramalho Carlos prc@inesc.pt
669 Globalnet Communications Real Barriere (514) 651-6164
670 Product Line Engineer SVEC Computer Corp.
Rich Huang msumgr@enya.cc.fcu.edu.tw
671 Printer Systems Corp. Bill Babson bill@prsys.com
672 Contec Micro Electronics USA David Sheih (408) 434-6767
673 Unix Integration Services Chris Howard chris@uis.com
674 Dell Computer Corporation Steven Blair sblair@dell.com
675 Whittaker Electronic Systems Michael McCune mccune@cerf.net
676 QPSX Communications David Pascoe davidp@qpsx.oz.au
677 Loral WDl Mike Aronson Mike_Aronson@msgate.wdl.loral.com
678 Federal Express Corp. Randy Hale (901) 369-2152
679 E-COMMS Inc. Harvey Teale (206) 857-3399
680 Software Clearing House Tom Caris ca@sch.com
681 Antlow Computers LTD. C. R. Bates 44-635-871829
682 Emcom Corp. Mike Swartz emcom@cerf.net
683 Extended Systems, Inc.
Al Youngwerth alberty@tommy.extendsys.com
684 Sola Electric Mike Paulsen (708) 439-2800
685 Esix Systems, Inc. Anthony Chung esix@esix.tony.com
686 3M/MMM Chris Amley ccamley@mmm.com
687 Cylink Corp. Ed Chou ed@cylink.com
688 Znyx Advanced Systems Division, Inc.
Alan Deikman aland@netcom.com
689 Texaco, Inc. Jeff Lin linj@Texaco.com
690 McCaw Cellular Communication Corp. Tri Phan tri.phan@mccaw.com
691 ASP Computer Product Inc. Elise Moss 71053.1066@compuserve.com
692 HiPerformance Systems Mike Brien +27-11-806-1000
693 Regionales Rechenzentrum
Sibylle Schweizer unrz54@daphne.rrze.uni-erlangen.de
694 SAP AG Dr. Uwe Hommel +49 62 27 34 0
695 ElectroSpace System Inc.
Dr. Joseph Cleveland e03353@esitx.esi.org
696 (Unassigned)
697 MultiPort Software Reuben Sivan 72302.3262@compuserve.com
698 Combinet, Inc. Samir Sawhney samir@combinet.com
699 TSCC Carl Wist carlw@tscc.com
700 Teleos Communications Inc. Bill Nayavich wln@teleoscom.com
701 Alta Research Amy Saperstein (305) 428-8535
702 Independence Blue Cross Bill Eshbach esh@ibx.com
703 ADACOM Station Interconnectivity LTD.
Itay Kariv +9 72 48 99 89 9
704 MIROR Systems Frank Kloes +27 12 911 0003
705 Merlin Gerin Adam Stolinski (714) 557-1637 x249
706 Owen-Corning Fiberglas Tom Mann mann.td@ocf.compuserve.com
707 Talking Networks Inc. Terry Braun tab@lwt.mtxinu.com
708 Cubix Corporation Rebekah Marshall (702) 883-7611

709 Formation Inc. Bob Millis bobm@formail.formation.com
710 Lannair Ltd. Pablo Brenner pablo@lannet.com
711 LightStream Corp. Chris Chiotasso chris@lightstream.com
712 LANart Corp. Doron I. Gartner doron@lanart.com
713 University of Stellenbosch Graham Phillips phil@cs.sun.ac.za
714 Wyse Technology Bill Rainey bill@wyse.com
715 DSC Communications Corp. Colm Bergin cbergin@cpdsc.com
716 NetEc Thomas Krichel netec@uts.mcc.ac.uk
717 Breltenbach Software Engineering Hilmar Tuneke +02 92 49 70 00
718 Victor Company of Japan,Limited
Atsushi Sakamoto 101176.2703@compuserve.com
719 Japan Direx Corporation Teruo Tomiyama +81 3 3498 5050
720 NECSY Network Control Systems S.p.A. Piero Fiozzo fip@necsy.it
721 ISDN Systems Corp. Jeff Milloy p00633@psilink.com
722 Zero-One Technologies, LTD. Curt Chen + 88 62 56 52 32 33
723 Radix Technologies, Inc. Steve Giles giless@delphi.com
724 National Institute of Standards and Technology
Jim West west@mgmt3.ncsl.nist.gov
725 Digital Technology Inc. Chris Gianattasio gto@lanhawk.com
726 Castelle Corp. Waiming Mok wmm@castelle.com
727 Presticom Inc. Martin Dube 76270.2672@compuserve.com
728 Showa Electric Wire & Cable Co., Ltd.
Robert O'Grady kfn@tanuki.twics.co.jp
729 SpectraGraphics Jack Hinkle hinkle@spectra.com
730 Connectware Inc. Rick Downs rxd4@acsysinc.com
731 Wind River Systems Emily Hipp hipp@wrs.com
732 RADWAY International Ltd. Doron Kolton 0005367977@mcimail.com
733 System Management ARTS, Inc. Alexander Dupuy dupuy@smarts.com
734 Persoft, Inc. Steven M. Entine entine@pervax.persoft.com
735 Xnet Technology Inc. Esther Chung estchung@xnet-tech.com
736 Unison-Tymlabs Dean Andrews ada@unison.com
737 Micro-Matic Research Patrick Lemli 73677.2373@compuserve.com
738 B.A.T.M. Advance Technologies
Nahum Killim bcrystal@actcom.co.il
739 University of Copenhagen Kim H|glund shotokan@diku.dk
740 Network Security Systems, Inc.
Carleton Smith rpitt@nic.cerf.net
741 JNA Telecommunications Sean Cody seanc@jna.com.au
742 Encore Computer Corporation Tony Shafer tshafer@encore.com
743 Central Intelligent Agency Carol Jobusch 703 242-2485
744 ISC (GB) Limited Mike Townsend miket@cix.compulink.co.uk
745 Digital Communication Associates Ravi Shankar shankarr@dca.com
746 CyberMedia Inc. Unni Warrier unni@cs.ucla.edu
747 Distributed Systems International, Inc.
Ron Mackey rem@dsiinc.com
748 Peter Radig EDP-Consulting Peter Radig +49 69 9757 6100
749 Vicorp Interactive Systems Phil Romine phil@vis.com
750 Inet Inc. Bennie Lopez brl@inetinc.com

751 Argonne National Laboratory Michael Shaffer mashaffer@anl.gov
752 Tek Logix Peter Palsall 905 625-4121
753 North Western University Phil Draughon jpd@nwu.edu
754 Astarte Fiber Networks James Garnett garnett@catbelly.com
755 Diederich & Associates, Inc.
Douglas Capitano dlcapitano@delphi.com
756 Florida Power Corporation Bob England rengland@fpc.com
757 ASK/INGRES Howard Dernehl howard@ingres.com
758 Open Network Enterprise Spada Stefano +39 39 245-8101
759 The Home Depot Keith Porter ktp01@homedepot.com
760 Pan Dacom Telekommunikations Jens Andresen +49 40 644 09 71
761 NetTek Steve Kennedy steve@gbnet.com
762 Karlnet Corp. Doug Kall kbridge@osu.edu
763 Efficient Networks, Inc. Thirl Johnson (214) 991-3884
764 Fiberdata Jan Fernquist +46 828 8383
765 Lanser Emil Smilovici (514) 485-7104
766 Telebit Communications A/S Peder Chr. Norgaard pcn@tbit.dk
767 HILAN GmbH Markus Pestinger markus@lahar.ka.sub.org
768 Network Computing Inc.
Fredrik Noon fnoon@ncimail.mhs.compuserve.com
769 Walgreens Company Denis Renaud (708) 818-4662
770 Internet Initiative Japan Inc. Toshiharu Ohno tony-o@iij.ad.jp
771 GP van Niekerk Ondernemings
Gerrit van Niekerk gvanniek@dos-lan.cs.up.ac.za
772 DSP & Telecoms Research Group
Patrick McGleenon p.mcgleenon@ee.queens-belfast.ac.uk
773 Securities Industry Automation Corporation
Chiu Szeto cszeto@prism.poly.edu
774 SYNaPTICS David Gray david@synaptics.ie
775 Data Switch Corporation Joe Welfeld jwelfeld@dasw.com
776 Telindus Distribution Karel Van den Bogaert kava@telindus.be
777 MAXM Systems Corporation Gary Greathouse ggreathouse@maxm.com
778 Fraunhofer Gesellschaft
Jan Gottschick jan.gottschick@isst.fhg.de
779 EQS Business Services Ken Roberts kroberts@esq.com
780 CNet Technology Inc. Repus Hsiung idps17@shts.seed.net.tw
781 Datentechnik GmbH Thomas Pischinger +43 1 50100 266
782 Network Solutions Inc. Dave Putman davep@netsol.com
783 Viaman Software Vikram Duvvoori info@viman.com
784 Schweizerische Bankgesellschaft Zuerich
Roland Bernet Roland.Bernet@zh014.ubs.ubs.ch
785 University of Twente - TIOS Aiko Pras pras@cs.utwente.nl
786 Simplesoft Inc. Sudhir Pendse sudhir@netcom.com
787 Stony Brook, Inc. Ken Packert p01006@psilink.com
788 Unified Systems Solutions, Inc.
Steven Morgenthal smorgenthal@attmail.com
789 Network Appliance Corporation
Varun Mehta varun@butch.netapp.com

790 Ornet Data Communication Technologies Ltd.
Haim Kurz haim@ornet.co.il
791 Computer Associates International
Glenn Gianino giagl01@usildaca.cai.com
792 Multipoint Network Inc. Michael Nguyen mike@multipoint.com
793 NYNEX Science & Technology Lily Lau llau@nynexst.com
794 Commercial Link Systems Wiljo Heinen wiljo@freeside.cls.de
795 Adaptec Inc. Tom Battle tab@lwt.mtxinu.com
796 Softswitch Charles Springer cjs@ssw.com
797 Link Technologies, Inc. Roy Chu royc@wyse.com
798 IIS Olry Rappaport iishaifa@attmail.com
799 Mobile Solutions Inc. Dale Shelton dshelton@srg.srg.af.mil
800 Xylan Corp. Burt Cyr burt@xylan.com
801 Airtech Software Forge Limited
Callum Paterson tsf@cix.compulink.co.uk
802 National Semiconductor Maurice Turcotte mturc@atlanta.nsc.com
803 Video Lottery Technologies Angelo Lovisa ange@awd.cdc.com
804 National Semiconductor Corp Waychi Doo wcd@berlioz.nsc.com
805 Applications Management Corp
Terril (Terry) Steichen tjs@washington.ssds.com
806 Travelers Insurance Company Eric Miner ustrv67v@ibmmail.com
807 Taiwan International Standard Electronics Ltd.
B. J. Chen bjchen@taisel.com.tw
808 US Patent and Trademark Office Rick Randall randall@uspto.gov
809 Hynet, LTD. Amir Fuhrmann amf@teleop.co.il
810 Aydin, Corp. Rick Veher (215) 657-8600
811 ADDTRON Technology Co., LTD. Tommy Tasi +8 86-2-4514507
812 Fannie Mae David King s4ujdk@fnma.com
813 MultiNET Services Hubert Martens martens@multinet.de
814 GECKO mbH Holger Dopp hdo@gecko.de
815 Memorex Telex Mike Hill hill@raleng.mtc.com
816 Advanced Communications Networks (ACN) SA
Antoine Boss +41 38 247434
817 Telekurs AG Jeremy Brookfield bkj@iris.F2.telekurs.ch
818 Victron bv Jack Stiekema jack@victron.nl
819 CF6 Company Francois Caron +331 4696 0060
820 Walker Richer and Quinn Inc.
Rebecca Higgins rebecca@elmer.wrq.com
821 Saturn Systems Paul Parker paul_parker@parker.fac.cs.cmu.edu
822 Mitsui Marine and Fire Insurance Co. LTD.
Kijuro Ikeda +813 5389 8111
823 Loop Telecommunication International, Inc.
Charng-Show Li +886 35 787 696
824 Telenex Corporation James Krug (609) 866-1100
825 Bus-Tech, Inc. Charlie Zhang chun@eecs.cory.berkley.edu
826 ATRIE Fred B.R. Tuang cmp@fddi3.ccl.itri.org.tw
827 Gallagher & Robertson A/S Arild Braathen arild@gar.no
828 Networks Northwest, Inc. John J. Hansen jhansen@networksnw.com

829 Conner Peripherials Richard Boyd rboyd@mailserver.conner.com
830 Elf Antar France P. Noblanc +33 1 47 44 45 46
831 Lloyd Internetworking Glenn McGregor glenn@lloyd.com
832 Datatec Industries, Inc. Chris Wiener cwiener@datatec.com
833 TAICOM Scott Tseng cmp@fddi3.ccl.itri.org.tw
834 Brown's Operating System Services Ltd.
Alistair Bell alistair@ichthya.demon.co.uk
835 MiLAN Technology Corp. Gopal Hegde gopal@milan.com
836 NetEdge Systems, Inc. Dave Minnich Dave_Minnich@netedge.com
837 NetFrame Systems George Mathew george_mathew@netframe.com
838 Xedia Corporation Colin Kincaid colin%madway.uucp@dmc.com
839 Pepsi Niraj Katwala niraj@netcom.com
840 Tricord Systems, Inc. Mark Dillon mdillon@tricord.mn.org
841 Proxim Inc. Russ Reynolds proxim@netcom.com
842 Applications Plus, Inc. Joel Estes joele@hp827.applus.com
843 Pacific Bell Aijaz Asif saasif@srv.PacBell.COM
844 Supernet Sharon Barkai sharon@supernet.com
845 TPS-Teleprocessing Systems Manfred Gorr gorr@tpscad.tps.de
846 Technology Solutions Company Niraj Katwala niraj@netcom.com
847 Computer Site Technologies Tim Hayes (805) 967-3494
848 NetPort Software John Bartas jbartas@sunlight.com
849 Alon Systems Menachem Szus 70571.1350@compuserve.com
850 Tripp Lite Lawren Markle 72170.460@compuserve.com
851 NetComm Limited
Paul Ripamonti paulri@msmail.netcomm.pronet.com
852 Precision Systems, Inc. (PSI)
Fred Griffin cheryl@empiretech.com
853 Objective Systems Integrators Ed Reeder Ed.Reeder@osi.com
854 Simpact Associates Inc.
Robert Patterson bpatterson@dcs.simpact.com
855 Systems Enhancement Corporation
Steve Held 71165.2156@compuserve.com
856 Information Integration, Inc. Gina Sun iiii@netcom.com
857 CETREL S.C. Louis Reinard ssc-re@cetrel.lu
858 ViaTech Development
Theodore J. Collins III ted.collins@vtdev.mn.org
859 Olivetti North America Tom Purcell tomp@mail.spk.olivetti.com
860 WILMA Nikolaus Schaller hns@ldv.e-technik.tu-muenchen.de
861 ILX Systems Inc. Peter Mezey peterm@ilx.com
862 Total Peripherals Inc. Mark Ustik (508) 393-1777
863 SunNetworks Consultant John Brady jbrady@fedeast.east.sun.com
864 Arkhon Technologies, Inc. Joe Wang rkhon@nic.cerf.net
865 Computer Sciences Corporation
George M. Dands dands@sed.csc.com
866 Philips.TRT Thibault Muchery +33 14128 7000
867 Katron Technologies Inc. Robert Kao +88 627 991 064
868 Transition Engineering Inc.
Hemant Trivedi hemant@transition.com

869 Altos Engineering Applications, Inc.
Wes Weber or Dave Erhart altoseng@netcom.com
870 Nicecom Ltd. Arik Ramon arik@nicecom.nice.com
871 Fiskars/Deltec Carl Smith (619) 291-2973
872 AVM GmbH Andreas Stockmeier stocki@avm-berlin.de
873 Comm Vision Richard Havens (408) 923 0301 x22
874 Institute for Information Industry
Peter Pan peterpan@pdd.iii.org.tw
875 Legent Corporation Gary Strohm gstrohm@legent.com
876 Network Automation Doug Jackson +64 6 285 1711
877 NetTech Marshall Sprague marshall@nettech.com
878 Coman Data Communications Ltd.
Zvi Sasson coman@nms.cc.huji.ac.il
879 Skattedirektoratet Karl Olav Wroldsen +47 2207 7162
880 Client-Server Technologies Timo Metsaportti timo@itf.fi
881 Societe Internationale de Telecommunications Aeronautiques
Chuck Noren chuck.noren@es.atl.sita.int
882 Maximum Strategy Inc. Paul Stolle pstolle@maxstrat.com
883 Integrated Systems, Inc. Michael Zheng mz@isi.com
884 E-Systems, Melpar Rick Silton rsilton@melpar.esys.com
885 Reliance Comm/Tec Mark Scott 73422.1740@compuserve.com
886 Summa Four Inc. Paul Nelson (603) 625-4050
887 J & L Information Systems Rex Jackson (818) 709-1778
888 Forest Computer Inc. Dave Black dave@forest.com
889 Palindrome Corp. Jim Gast jgast@palindro.mhs.compuserve.com
890 ZyXEL Communications Corp. Harry Chou howie@csie.nctu.edu.tw
891 Network Managers (UK) Ltd, Mark D Dooley mark@netmgrs.co.uk
892 Sensible Office Systems Inc. Pat Townsend (712) 276-0034
893 Informix Software Anthony Daniel anthony@informix.com
894 Dynatek Communications Howard Linton (703) 490-7205
895 Versalynx Corp. Dave Fisler (619) 536-8023
896 Potomac Scheduling Communications Company
David Labovitz del@access.digex.net
897 Sybase Inc. Dave Meldrum meldrum@sybase.com
898 DiviCom Inc. Eyal Opher eyal@divi.com
899 Datus elektronische Informationssysteme GmbH
Hubert Mertens marcus@datus.uucp
900 Matrox Electronic Systems Limited
Marc-Andre Joyal marc-andre.joyal@matrox.com
901 Digital Products, Inc. Ross Dreyer rdreyer@digprod.com
902 Scitex Corp. Ltd. Yoav Chalfon yoav_h@ird.scitex.com
903 RAD Vision Oleg Pogorelik radvis@vax.trendline.co.il
904 Tran Network Systems Paul Winkeler paulw@revco.com
905 Scorpion Logic Sean Harding +09 2324 5672
906 Inotech Inc. Eric Jacobs (703) 641-0469
907 Controlled Power Co. Yu Chin 76500,3160@compuserve.com
908 Elsag Bailey Incorporate Derek McKearney mckearney@bailey.com
909 J.P. Morgan Chung Szeto szeto_chung@jpmorgan.com

910 Clear Communications Corp. Kurt Hall khall@clear.com
911 General Technology Inc. Perry Rockwell (407) 242-2733
912 Adax Inc. Jory Gessow jory@adax.com
913 Mtel Technologies, Inc. Jon Robinson 552-3355@mcimail.com
914 Underscore, Inc. Jeff Schnitzer jds@underscore.com
915 SerComm Corp. Ben Lin +8 862-577-5400
916 Baxter Healthcare Corporation
Joseph Sturonas sturonaj@mpg.mcgawpark.baxter.com
917 Tellus Technology Ron Cimorelli (510) 498-8500
918 Continuous Electron Beam Accelerator Facility
Paul Banta banta@cebaf.gov
919 Canoga Perkins Margret Siska (818) 718-6300
920 R.I.S Technologies Fabrice Lacroix +33 7884 6400
921 INFONEX Corp. Kazuhiro Watanabe kazu@infonex.co.jp
922 WordPerfect Corp. Douglas Eddy eddy@wordperfect.com
923 NRaD Russ Carleton roccor@netcom.com
924 Hong Kong Telecommunications Ltd. K. S. Luk +8 52 883 3183
925 Signature Systems Doug Goodall goodall@crl.com
926 Alpha Technologies LTD. Guy Pothiboon (604) 430-8908
927 PairGain Technologies, Inc. Ken Huang kenh@pairgain.com
928 Sonic Systems Sudhakar Ravi sudhakar@sonicsys.com
929 Steinbrecher Corp. Kary Robertson krobertson@delphi.com
930 Centillion Networks, Inc. Derek Pitcher derek@lanspd.com
931 Network Communication Corp.
Tracy Clark ncc!central!tracyc@netcomm.attmail.com
932 Sysnet A.S. Carstein Seeberg case@sysnet.no
933 Telecommunication Systems Lab Gerald Maguire maguire@it.kth.se
934 QMI Scott Brickner (410) 573-0013
935 Phoenixtec Power Co., LTD. An-Hsiang Tu +8 862 646 3311
936 Hirakawa Hewtech Corp. H. Ukaji lde02513@niftyserve.or.jp
937 No Wires Needed B.V. Arnoud Zwemmer roana@cs.utwente.nl
938 Primary Access Kerstin Lodman lodman@priacc.com
939 Enterprises.FDSW Dag Framstad dag.framstad@fdsw.no
940 Grabner & Kapfer GnbR Vinzenz Grabner zen@wsr.ac.att
941 Nemesys Research Ltd. Michael Dixon mjd@nemesys.co.uk
942 Pacific Communication Sciences, Inc. (PSCI)
Yvonne Kammer mib-contact@pcsi.com
943 Level One Communications, Inc.
Moshe Kochinski moshek@level1.com
944 Fast Track, Inc. Andrew H. Dimmick adimmick@world.std.com
945 Andersen Consulting, OM/NI Practice
Greg Tilford p00919@psilink.com
946 Bay Technologies Pty Ltd. Paul Simpson pauls@baytech.com.au
947 Integrated Network Corp. Daniel Joffe wandan@integnet.com
948 Epoch, Inc. David Haskell deh@epoch.com
949 Wang Laboratories Inc. Pete Reilley pvr@wiis.wang.com
950 Polaroid Corp. Sari Germanos sari@temerity.polaroid.com
951 Sunrise Sierra Gerald Olson (510) 443-1133

952 Silcon Group Bjarne Bonvang +45 75 54 22 55
953 Coastcom Donald Pickerel dpickere@netcom.com
954 4th DIMENSION SOFTWARE LTD.
Thomas Segev/Ely Hofner autumn@zeus.datasrv.co.il
955 SEIKO SYSTEMS Inc. Kiyoshi Ishida ishi@ssi.co.jp
956 PERFORM Jean-Hugues Robert +33 42 27 29 32
957 TV/COM International Jean Tellier (619) 675-1376
958 Network Integration, Inc.
Scott C. Lemon slemon@nii.mhs.compuserve.com
959 Sola Electric, A Unit of General Signal
Bruce Rhodes 72360,2436@compuserve.com
960 Gradient Technologies, Inc. Geoff Charron geoff@gradient.com
961 Tokyo Electric Co., Ltd. A. Akiyama +81 558 76 9606
962 Codonics, Inc. Joe Kulig jjk@codonics.com
963 Delft Technical University Mark Schenk m.schenk@ced.tudelft.nl
964 Carrier Access Corp. Roger Koenig tomquick@carrier.com
965 eoncorp Barb Wilson wilsonb@eon.com
966 Naval Undersea Warfare Center
Mark Lovelace lovelace@mp34.nl.nuwc.navy.mil
967 AWA Limited Mike Williams +61 28 87 71 11
968 Distinct Corp. Tarcisio Pedrotti tarci@distinct.com
969 National Technical University of Athens
Theodoros Karounos karounos@phgasos.ntua.gr
970 BGS Systems, Inc. Amr Hafez amr@bgs.com
971 McCaw Wireless Data Inc. Brian Bailey bbailey@airdata.com
972 Bekaert Koen De Vleeschauwer kdv@bekaert.com
973 Epic Data Inc. Vincent Lim vincent_lim@epic.wimsey.com
974 Prodigy Services Co. Ed Ravin elr@wp.prodigy.com
975 First Pacific Networks (FPN) Randy Hamilton randy@fpn.com
976 Xylink Ltd. Bahman Rafatjoo 100117.665@compuserve.com
977 Relia Technologies Corp. Fred Chen fredc@relia1.relia.com.tw
978 Legacy Storage Systems Inc.
James Hayes james@lss-chq.mhs.compuserve.com
979 Digicom, SPA Claudio Biotti +39 3312 0 0122
980 Ark Telecom Alan DeMars alan@arktel.com
981 National Security Agency (NSA)
Cynthia Stewart maedeen@romulus.ncsc.mil
982 Southwestern Bell Corporation
Brian Bearden bb8840@swuts.sbc.com
983 Virtual Design Group, Inc.
Chip Standifer 70650.3316@compuserve.com
984 Rhone Poulenc Olivier Pignault +33 1348 2 4053
985 Swiss Bank Corporation Neil Todd toddn@gb.swissbank.com
986 ATEA N.V. Walter van Brussel p81710@banyan.atea.be
987 Computer Communications Specialists, Inc.
Carolyn Zimmer cczimmer@crl.com
988 Object Quest, Inc. Michael L. Kornegay mlk@bir.com
989 DCL System International, Ltd. Gady Amit gady-a@dcl-see.co.il

990	SOLITON SYSTEMS K.K.	Masayuki Yamai +81 33356 6091
991	U S Software	Don Dunstan ussw@netcom.com
992	Systems Research and Applications Corporation	Todd Herr herrt@smtplink.sra.com
993	University of Florida	Todd Hester todd@circa.ufl.edu
994	Dantel, Inc.	John Litster (209) 292-1111
995	Multi-Tech Systems, Inc.	Dale Martenson (612) 785-3500 x519
996	Softlink Ltd.	Moshe Leibovitch softlink@zeus.datasrv.co.il
997	ProSum	Christian Bucari +33.1.4590.6231
998	March Systems Consultancy, Ltd.	Ross Wakelin r.wakelin@march.co.uk
999	Hong Technology, Inc.	Walt Milnor brent@oceania.com
1000	Internet Assigned Numbers Authority	iana@isi.edu
1001	PECO Energy Co.	Rick Rioboli u002rdr@peco.com
1002	United Parcel Service	Steve Pollini nrd1sjp@nrd.ups.com
1003	Storage Dimensions, Inc.	Michael Torhan miketorh@xstor.com
1004	ITV Technologies, Inc.	Jacob Chen itv@netcom.com
1005	TCPSI	Victor San Jose Victor.Sanjose@sp1.y-net.es
1006	Promptus Communications, Inc.	Paul Fredette (401) 683-6100
1007	Norman Data Defense Systems	Kristian A. Bognaes norman@norman.no
1008	Pilot Network Services, Inc.	Rob Carrade carrade@pilot.net
1009	Integrated Systems Solutions Corporation	Chris Cowan cc@austin.ibm.com
1010	SISRO	Kamp Alexandre 100074.344@compuserve.com
1011	NetVantage	Kevin Bailey speed@kaiwan.com
1012	Marconi S.p.A.	Giuseppe Grasso gg@relay.marconi.it
1013	SURECOM	Mike S. T. Hsieh +886.25.92232
1014	Royal Hong Kong Jockey Club	Edmond Lee 100267.3660@compuserve.com
1015	Gupta	Howard Cohen hcohen@gupta.com
1016	Tone Software Corporation	Neil P. Harkins (714) 991-9460
1017	Opus Telecom	Pace Willisson pace@blitz.com
1018	Cogsys Ltd.	Niall Teasdale niall@hedgehog.demon.co.uk
1019	Komatsu, Ltd.	Akifumi Katsushima +81 463.22.84.30
1020	ROI Systems, Inc	Michael Wong (801) 942-1752
1021	Lightning Instrumentation SA	Mike O'Dowd odowd@lightning.ch
1022	TimeStep Corp.	Stephane Lacelle slacelle@newbridge.com
1023	INTELSAT	Ivan Giron i.giron@intelsat.int
1024	Network Research Corporation Japan, Ltd.	Tsukasa Ueda 100156.2712@compuserve.com
1025	Relational Development, Inc.	Steven Smith rdi@ins.infonet.net
1026	Emerald Systems, Corp.	Robert A. Evans Jr. (619) 673-2161 x5120
1027	Mitel, Corp.	Tom Quan tq@software.mitel.com
1028	Software AG	Peter Cohen sagpc@sagus.com
1029	MillenNet, Inc.	Manh Do (510) 770-9390
1030	NK-EXA Corp.	Ken'ichi Hayami hayami@dst.nk-exa.co.jp
1031	BMC Software	Chris Sharp csharp@patrol.com

1032 StarFire Enterprises, Inc. Lew Gaiter lg@starfire.com
1033 Hybrid Networks, Inc. Doug Muirhead dougm@hybrid.com
1034 Quantum Software GmbH Thomas Omerzu omerzu@quantum.de
1035 Openvision Technologies Limited
Andrew Lockhart alockhart@openvision.co.uk
1036 Healthcare Communications, Inc. (HCI)
Larry Streepy streepy@healthcare.com
1037 SAIT Systems Hai Dotu +3223.7053.11
1038 SAT Mleczko Alain +33.1.4077.1156
1039 CompuSci Inc., Bob Berry bberry@compusci.com
1040 Aim Technology Ganesh Rajappan ganeshr@aim.com
1041 CIESIN Kalpesh Unadkat kalpesh@ciesin.org
1042 Systems & Technologies International
Howard Smith ghamex@aol.com
1043 Israeli Electric Company (IEC) Yoram Harlev yoram@yor.iec.co.il
1044 Phoenix Wireless Group, Inc.
Gregory M. Buchanan buchanan@pwgi.com
1045 SWL Bill Kight wkightgrci.com (410) 290.7245
1046 nCUBE Greg Thompson gregt@ncube.com
1047 Cerner, Corp. Dennis Avondet (816) 221.1024 X2432
1048 Andersen Consulting Mark Lindberg mlindber@andersen.com
1049 Lincoln Telephone Company Bob Morrill root@si6000.ltec.com
1050 Acer Jay Tao jtao@Altos.COM
1051 Cedros Juergen Haakert +49.2241.9701.80
1052 AirAccess Ido Ophir 100274.365@compuserve.com
1053 Expersoft Corporation David Curtis curtis@expersoft.com
1054 Eskom Sanjay Lakhani h00161@duvi.eskom.co.za
1055 SBE, Inc. Vimal Vaidya vimal@sbei.com
1056 EBS, Inc. Emre Gundogan baroque@ebs.com
1057 American Computer and Electronics, Corp.
Tom Abraham tha@acec.com
1058 Syndesis Limited Wil Macaulay wil@syndesis.com
1059 Isis Distributed Systems, Inc. Ken Chapman kchapman@isis.com
1060 Priority Call Management Greg Schumacher gregs@world.std.com
1061 Koelsch & Altmann GmbH
Christian Schreyer 100142.154@compuserve.com
1062 WIPRO INFOTECH LTD. Chandrashekar Kapse kapse@wipinfo.soft.net
1063 Controlware Uli Blatz ublatz@cware.de
1064 Mosaic Software W.van Biljon willem@mosaic.co.za
1065 Canon Information Systems
Victor Villalpando vvillalp@cisoc.canon.com
1066 AmericaOnline Andrew R. Scholnick andrew@aol.net
1067 Whitetree Network Technologies, Inc.
Carl Yang cyang@whitetree.com
1068 Xetron Corp. Dave Alverson davea@xetron.com
1069 Target Concepts, Inc. Bill Price bprice@tamu.edu
1070 DMH Software Yigal Hochberg 72144.3704@compuserve.com
1071 Innosoft International, Inc. Jeff Allison jeff@innosoft.com

1072	Controlware GmbH	Uli Blatz	ublatz@cware.de
1073	Telecommunications Industry Association (TIA)	Mike Youngberg	mikey@synacom.com
1074	Boole & Babbage	Rami Rubin	rami@boole.com
1075	System Engineering Support, Ltd.	Vince Taylor	+44 454.614.638
1076	SURFnet	Ton Verschuren	Ton.Verschuren@surfnet.nl
1077	OpenConnect Systems, Inc.	Mark Rensmeyer	mrensme@oc.com
1078	PDTS (Process Data Technology and Systems)	Martin Gutenbrunner	GUT@pdts.mhs.compuserve.com
1079	Cornet, Inc.	Nat Kumar	(703) 658-3400
1080	NetStar, Inc.	John K. Renwick	jkr@netstar.com
1081	Semaphore Communications, Corp.	Jimmy Soetarman	(408) 980-7766
1082	Casio Computer Co., Ltd.	Shouzo Ohdate	ohdate@casio.co.jp
1083	CSIR	Frikkie Strecker	fstreck@marge.mikom.csir.co.za
1084	APOGEE Communications	Olivier Caleff	caleff@apogee-com.fr
1085	Information Management Company	Michael D. Liss	mliss@imc.com
1086	Wordlink, Inc.	Mike Aleckson	(314) 878-1422
1087	PEER	Avinash S. Rao	arao@cranel.com
1088	Telstra Corp.	Michael Scollay	michaels@ind.tansu.com.au
1089	Net X, Inc.	Sridhar Kodela	techsupp@netx.unicomp.net
1090	PNC PLC	Gordon Tees	+44 716.061.200

To request an assignment of an Enterprise Number send the complete company name, address, and phone number; and the contact's person complete name, address, phone number, and email mailbox in an email message to <iana-mib@isi.edu>.

[]

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

SGMP Vendor Specific Codes: [obsolete]

Prefix: 1,255,

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

[]

URL = ftp://ftp.isi.edu/in-notes/iana/assignments/sgmp-vendor-specific-codes

ADDRESS RESOLUTION PROTOCOL PARAMETERS

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

REVERSE ADDRESS RESOLUTION PROTOCOL OPERATION CODES

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

DYNAMIC REVERSE ARP

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

INVERSE ADDRESS RESOULUTION PROTOCOL

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

Assignments:

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

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

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

Protocol Type (pro)

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

REFERENCES

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

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

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

PEOPLE

[AGM] Andy Malis <malis_a@timeplex.com>

[GXC1] George Clapp <meritec!clapp@bellcore.bellcore.com>

[GXP] Gill Pratt <gill%mit-ccc@MC.LCS.MIT.EDU>

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

[JKR1] Joyce K. Reynolds <jkrey@isi.edu>

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

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

[PXK] Philip Koch <Philip.Koch@DARTMOUTH.EDU>

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

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

[David Brownell]

[Mark Laubach]

[Yakov Rekhter] <Yakov@IBM.COM>

[]

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

IEEE 802 NUMBERS OF INTEREST

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

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

Assignments:

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

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

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

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

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

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

REFERENCES

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

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

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

PEOPLE

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

[JXJ] <mystery contact>

[]

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

ETHER TYPES

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

If you need an Ether Type, contact:

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

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

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

Assignments:

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

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

32869	8065	-	-	Univ. of Mass. @ Amherst	[XEROX]
32870	8066	-	-	Univ. of Mass. @ Amherst	[XEROX]
32871	8067	-	-	Veeco Integrated Auto.	[XEROX]
32872	8068	-	-	General Dynamics	[XEROX]
32873	8069	-	-	AT&T	[XEROX]
32874	806A	-	-	Autophon	[XEROX]
32876	806C	-	-	ComDesign	[XEROX]
32877	806D	-	-	Computgraphic Corp.	[XEROX]
32878	806E-8077	-	-	Landmark Graphics Corp.	[XEROX]
32890	807A	-	-	Matra	[XEROX]
32891	807B	-	-	Dansk Data Elektronik	[XEROX]
32892	807C	-	-	Merit Internodal	[HWB]
32893	807D-807F	-	-	Vitalink Communications	[XEROX]
32896	8080	-	-	Vitalink TransLAN III	[XEROX]
32897	8081-8083	-	-	Counterpoint Computers	[XEROX]
32923	809B	-	-	Appletalk	[XEROX]
32924	809C-809E	-	-	Datability	[XEROX]
32927	809F	-	-	Spider Systems Ltd.	[XEROX]
32931	80A3	-	-	Nixdorf Computers	[XEROX]
32932	80A4-80B3	-	-	Siemens Gammasonics Inc.	[XEROX]
32960	80C0-80C3	-	-	DCA Data Exchange Cluster	[XEROX]
	80C4			Banyan Systems	[XEROX]
	80C5			Banyan Systems	[XEROX]
32966	80C6	-	-	Pacer Software	[XEROX]
32967	80C7	-	-	Applitek Corporation	[XEROX]
32968	80C8-80CC	-	-	Intergraph Corporation	[XEROX]
32973	80CD-80CE	-	-	Harris Corporation	[XEROX]
32975	80CF-80D2	-	-	Taylor Instrument	[XEROX]
32979	80D3-80D4	-	-	Rosemount Corporation	[XEROX]
32981	80D5	-	-	IBM SNA Service on Ether	[XEROX]
32989	80DD	-	-	Varian Associates	[XEROX]
32990	80DE-80DF	-	-	Integrated Solutions TRFS	[XEROX]
32992	80E0-80E3	-	-	Allen-Bradley	[XEROX]
32996	80E4-80F0	-	-	Datability	[XEROX]
33010	80F2	-	-	Retix	[XEROX]
33011	80F3	-	-	AppleTalk AARP (Kinetics)	[XEROX]
33012	80F4-80F5	-	-	Kinetics	[XEROX]
33015	80F7	-	-	Apollo Computer	[XEROX]
33023	80FF-8103	-	-	Wellfleet Communications	[XEROX]
33031	8107-8109	-	-	Symbolics Private	[XEROX]
33072	8130	-	-	Hayes Microcomputers	[XEROX]
33073	8131	-	-	VG Laboratory Systems	[XEROX]
	8132-8136			Bridge Communications	[XEROX]
33079	8137-8138	-	-	Novell, Inc.	[XEROX]
33081	8139-813D	-	-	KTI	[XEROX]
	8148			Logicraft	[XEROX]
	8149			Network Computing Devices	[XEROX]
	814A			Alpha Micro	[XEROX]

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

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

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

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

IANA ETHERNET ADDRESS BLOCK

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

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

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

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

IEEE Token Ring bit transmission order: 00 00 7A

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

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

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

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

1 = Assigned by IANA for other uses

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

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

1.0.94.0.0.0 to 1.0.94.127.255.255 in dotted decimal

ETHERNET VENDOR ADDRESS COMPONENTS

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

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

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

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

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

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

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

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

ETHERNET MULTICAST ADDRESSES

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

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

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

Broadcast Address:

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

REFERENCES

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

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

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

PEOPLE

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

[DCP1] David Plummer <DCP@SCRC-QUABBIN.ARPA>

[DT15] Daniel Tappan <Tappan@BBN.COM>

[HWB] Hans-Werner Braun <HWB@MCR.UMICH.EDU>

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

[JKR1] Joyce K. Reynolds <jkrey@isi.edu>

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

[XEROX] Fonda Pallone (415-813-7164)

[]

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

X.25 TYPE NUMBERS

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

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

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

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

REFERENCES

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

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

PEOPLE

[AGM] Andy Malis <malis_a@timeplex.com>

[GS2] Greg Satz <satz@CISCO.COM>

[]

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

PUBLIC DATA NETWORK NUMBERS

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

Assignments:

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

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

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

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

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

REFERENCES

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

PEOPLE

[ABB2] A. Blasco Bonito <blasco@ICNUCEVM.CNUCE.CNR.IT>

[AD67] Andy Davis <andy@SPIDER.CO.UK>

[AXH] Arthur Harvey <harvey@gah.enet.dec.com>

[AXM] Alex Martin <---none--->

[BXD] Brian Dockter <---none--->

[FXB] <mystery contact>

[GB7] Gerd Beling <GBELING@ISI.EDU>

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

[JD21] Jonathan Dreyer <Dreyer@CCV.BBN.COM>

[JFW] Jon F. Wilkes <Wilkes@CCINT1.RSRE.MOD.UK>

[JK64] mystery contact!

[JXE2] Jeanne Evans <JME%RSRE.MOD.UK@CS.UCL.AC.UK>

[LZ15] Lee Ziegenhals <lcz@sat.datapoint.com>

[MS56] Marvin Solomon <solomon@CS.WISC.EDU>

[MO2] Michael O'Brien <obrien@AEROSPACE.AERO.ORG>

[OXG] Oyvind Gjerstad <ogj%tglobe2.UUCP@nac.no>

[PAM6] Paul McNabb <pam@PURDUE.EDU>

[PK] Peter Kirstein <Kirstein@NSS.CS.UCL.AC.UK>

[PXD] Peter Delchiappo <---none--->

[PXF1] Per Futtrup <---none--->

[RAM57] Rex Mann <---none--->

[SXA3] Sten Andler <---none--->

[TN] Thomas Narten <narten@PURDUE.EDU>

[TC27] Thomas Calderwood <TCALDERW@BBN.COM>

[TXR] Tim Rylance <praxis!tkr@UUNET.UU.NET>

[UXB] <mystery contact>

[VXT] V. Taylor <vktaylor@NCS.DND.CA>

[]

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

MILNET LINK NUMBERS

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

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

Link Assignments:

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

MILNET LOGICAL ADDRESSES

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

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

logical host addresses are made by the NIC.

Logical Address Assignments:

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

MILNET X.25 ADDRESS MAPPINGS

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

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

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

ZZZZ F IIIHHZZ (SS)

where:

ZZZZ = 0000 as required

F = 0 because the address is a physical address;

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

zeros if required;

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

ZZ = 00 — and

(SS) — is optional

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

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

ZZZZ F RRRRRZZ (SS)

where:

ZZZZ = 0000 — as required

F = 1 — because the address is a logical address;

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

$$r = h * 256 + i$$

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

ZZ = 00 — and

(SS) — is optional

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

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

REFERENCES

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

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

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

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

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

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

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

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

PEOPLE

[DM28] Dennis Morris <Morrisd@IMO-UVAX.DCA.MIL>

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

[JBW1] Joseph Walters, Jr. <JWalters@BBN.COM>

[JGH] Jim Herman <Herman@CCJ.BBN.COM>

[MB] Michael Brescia <Brescia@CCV.BBN.COM>

[RXM] Robert Myhill <Myhill@CCS.BBN.COM>

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

[]

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

XNS PROTOCOL TYPES

Assigned well-known socket numbers

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

Assigned internet packet types

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

[]

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

INTERNET / XNS PROTOCOL MAPPINGS

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

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

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

[]

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

PRONET 80 TYPE NUMBERS

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

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

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

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

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

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

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

[]

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

NOVELL SAP NUMBERS OF INTEREST

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

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

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

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

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

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

This file is

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

[]

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

POINT-TO-POINT PROTOCOL FIELD ASSIGNMENTS

PPP DLL PROTOCOL NUMBERS

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

Assigned PPP DLL Protocol Numbers

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

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

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

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

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

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

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

PPP LCP AND IPCP CODES

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

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

* LCP Only
+ CCP Only

PPP LCP CONFIGURATION OPTION TYPES

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

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

PPP LCP FCS-ALTERNATIVES

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

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

PPP LCP CALLBACK OPERATION FIELDS

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

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

PPP IPCP CONFIGURATION OPTION TYPES

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

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

PPP ATCP CONFIGURATION OPTION TYPES

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

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

PPP OSINLCP CONFIGURATION OPTION TYPES

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

Type	Configuration Option
1	Align-NPDU

PPP BRIDGING CONFIGURATION OPTION TYPES

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

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

PPP BRIDGING MAC TYPES

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

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

PPP BRIDGING SPANNING TREE

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

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

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

REFERENCES

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

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

PEOPLE

[KEN] <ken@funk.com>

[SCHNEIDER] Kevin Schneider <kevin@adtran.com>

[]

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

MACHINE NAMES

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

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

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

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

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

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

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

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

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

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

REFERENCES

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

[]

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

OPERATING SYSTEM NAMES

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

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

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

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

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

WIN32
WYSE-WYXWARE
X11R3
XDE
XENIX

REFERENCES

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

[]

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

TERMINAL TYPE NAMES

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

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

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

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

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

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

```
IBM-3278-4-E
IBM-3278-5-E
IBM-3279-2-E
IBM-3279-3-E
IMLAC
INFOTON-100
INFOTON-400
INFOTONKAS
ISC-8001
LSI-ADM-1
LSI-ADM-11
LSI-ADM-12
LSI-ADM-2
LSI-ADM-20
LSI-ADM-22
LSI-ADM-220
LSI-ADM-3
LSI-ADM-31
LSI-ADM-3A
LSI-ADM-42
LSI-ADM-5
MEMOREX-1240
MICROBEE
MICROTERM-ACT-IV
MICROTERM-ACT-V
MICROTERM-ERGO-301
MICROTERM-MIME-1
MICROTERM-MIME-2
MICROTERM-ACT-5A
MICROTERM-TWIST
NEC-5520
NETRONICS
NETWORK-VIRTUAL-TERMINAL
OMRON-8025AG
PERKIN-ELMER-550
PERKIN-ELMER-1100
PERKIN-ELMER-1200
PERQ
PLASMA-PANEL
QUME-SPRINT-5
QUME-101
QUME-102
SOROC
SOROC-120
SOUTHWEST-TECHNICAL-PRODUCTS-CT82
SUN
SUPERBEE
SUPERBEE-III-M
```

```
TEC
TEKTRONIX-4006
TEKTRONIX-4010
TEKTRONIX-4012
TEKTRONIX-4013
TEKTRONIX-4014
TEKTRONIX-4023
TEKTRONIX-4024
TEKTRONIX-4025
TEKTRONIX-4027
TEKTRONIX-4105
TEKTRONIX-4107
TEKTRONIX-4110
TEKTRONIX-4112
TEKTRONIX-4113
TEKTRONIX-4114
TEKTRONIX-4115
TEKTRONIX-4125
TEKTRONIX-4404
TELERAY-1061
TELERAY-3700
TELERAY-3800
TELETEC-DATASCREEN
TELETERM-1030
TELETYPE-33
TELETYPE-35
TELETYPE-37
TELETYPE-38
TELETYPE-40
TELETYPE-43
TELEVIDEO-910
TELEVIDEO-912
TELEVIDEO-920
TELEVIDEO-920B
TELEVIDEO-920C
TELEVIDEO-925
TELEVIDEO-955
TELEVIDEO-950
TELEVIDEO-970
TELEVIDEO-975
TERMINET-1200
TERMINET-300
TI-700
TI-733
TI-735
TI-743
TI-745
TI-800
```

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

REFERENCES

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

[]

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

PROTOCOL AND SERVICE NAMES

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

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

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

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

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

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

REFERENCES

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

[]

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

Security Considerations

Security issues are not discussed in this memo.

Authors' Addresses

Joyce K. Reynolds
USC/Information Sciences Institute
4676 Admiralty Way
Marina del Rey, California 90292-6695

Phone: +1 310-822-1511
EMail: jkrey@isi.edu

Jon Postel
USC/Information Sciences Institute
4676 Admiralty Way
Marina del Rey, California 90292-6695

Phone: +1 310-822-1511
EMail: postel@isi.edu

[]