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503, 433, 349  
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## ASSIGNED NUMBERS

### STATUS OF THIS MEMO

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

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## INTRODUCTION

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

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Most of the protocols mentioned here are documented in the RFC series of notes. Some of the items listed are undocumented. Further information on protocols can be found in the memo "Official Internet Protocols" [118]. The more prominent and more generally used are documented in the "DDN Protocol Handbook, Volume Two, DARPA Internet Protocols" [45] prepared by the NIC. Other collections of older or obsolete protocols are contained in the "Internet Protocol Transition Workbook" [76], or in the "ARPANET Protocol Transition Handbook" [47]. For further information on ordering the complete 1985 DDN Protocol Handbook, write: SRI International (SRI-NIC), DDN Network Information Center, Room EJ291, 333 Ravenswood Avenue, Menlo Park, CA., 94025; or call: 1-800-235-3155. Also, the Internet Activities Board (IAB) publishes the "IAB Official Protocol Standards" [62], which describes the state of standardization of protocols used in the Internet. This document is issued quarterly. Current copies may be obtained from the DDN Network Information Center or from the IANA.

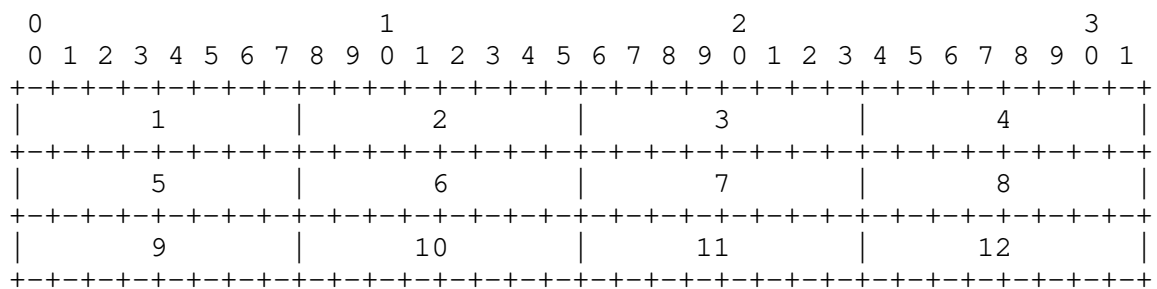
In the entries below, the name and mailbox of the responsible

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

## Data Notations

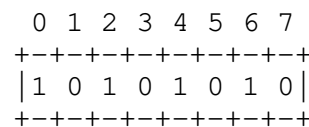
The convention in the documentation of Internet Protocols is to express numbers in decimal and to picture data in "big-endian" order [21]. That is, fields are described left to right, with the most significant octet on the left and the least significant octet on the right.

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

There are certain special cases for IP addresses [11]. These special cases can be concisely summarized using the earlier notation for an IP address:

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.

## VERSION NUMBERS

In the Internet Protocol (IP) [45,105] there is a field to identify the version of the internetwork general protocol. This field is 4 bits in size.

## Assigned Internet Version Numbers

| Decimal | Keyword | Version           | References |
|---------|---------|-------------------|------------|
| -----   | -----   | -----             | -----      |
| 0       |         | Reserved          | [JBP]      |
| 1-3     |         | Unassigned        | [JBP]      |
| 4       | IP      | Internet Protocol | [105,JBP]  |
| 5       | ST      | ST Datagram Mode  | [49,JWF]   |
| 6-14    |         | Unassigned        | [JBP]      |
| 15      |         | Reserved          | [JBP]      |

## PROTOCOL NUMBERS

In the Internet Protocol (IP) [45,105] there is a field, called Protocol, to identify the the next level protocol. This is an 8 bit field.

## Assigned Internet Protocol Numbers

| Decimal<br>----- | Keyword<br>----- | Protocol<br>-----              | References<br>----- |
|------------------|------------------|--------------------------------|---------------------|
| 0                |                  | Reserved                       | [JBP]               |
| 1                | ICMP             | Internet Control Message       | [97,JBP]            |
| 2                | IGMP             | Internet Group Management      | [43,JBP]            |
| 3                | GGP              | Gateway-to-Gateway             | [60,MB]             |
| 4                |                  | Unassigned                     | [JBP]               |
| 5                | ST               | Stream                         | [49,JWF]            |
| 6                | TCP              | Transmission Control           | [106,JBP]           |
| 7                | UCL              | UCL                            | [PK]                |
| 8                | EGP              | Exterior Gateway Protocol      | [123,DLM1]          |
| 9                | IGP              | any private interior gateway   | [JBP]               |
| 10               | BBN-RCC-MON      | BBN RCC Monitoring             | [SGC]               |
| 11               | NVP-II           | Network Voice Protocol         | [22,SC3]            |
| 12               | PUP              | PUP                            | [8,XEROX]           |
| 13               | ARGUS            | ARGUS                          | [RWS4]              |
| 14               | EMCON            | EMCON                          | [BN7]               |
| 15               | XNET             | Cross Net Debugger             | [56,JFH2]           |
| 16               | CHAOS            | Chaos                          | [NC3]               |
| 17               | UDP              | User Datagram                  | [104,JBP]           |
| 18               | MUX              | Multiplexing                   | [23,JBP]            |
| 19               | DCN-MEAS         | DCN Measurement Subsystems     | [DLM1]              |
| 20               | HMP              | Host Monitoring                | [59,RH6]            |
| 21               | PRM              | Packet Radio Measurement       | [ZSU]               |
| 22               | XNS-IDP          | XEROX NS IDP                   | [133,XEROX]         |
| 23               | TRUNK-1          | Trunk-1                        | [BWB6]              |
| 24               | TRUNK-2          | Trunk-2                        | [BWB6]              |
| 25               | LEAF-1           | Leaf-1                         | [BWB6]              |
| 26               | LEAF-2           | Leaf-2                         | [BWB6]              |
| 27               | RDP              | Reliable Data Protocol         | [138,RH6]           |
| 28               | IRTP             | Internet Reliable Transaction  | [79,TXM]            |
| 29               | ISO-TP4          | ISO Transport Protocol Class 4 | [63,RC77]           |
| 30               | NETBLT           | Bulk Data Transfer Protocol    | [20,DDC1]           |
| 31               | MFE-NSP          | MFE Network Services Protocol  | [124,BCH2]          |
| 32               | MERIT-INP        | MERIT Internodal Protocol      | [HWB]               |
| 33               | SEP              | Sequential Exchange Protocol   | [JC120]             |
| 34               | 3PC              | Third Party Connect Protocol   | [SAF3]              |
| 35-60            |                  | Unassigned                     | [JBP]               |
| 61               |                  | any host internal protocol     | [JBP]               |
| 62               | CFTP             | CFTP                           | [50,HCF2]           |

|        |             |                                   |            |
|--------|-------------|-----------------------------------|------------|
| 63     |             | any local network                 | [JBP]      |
| 64     | SAT-EXPAK   | SATNET and Backroom EXPAK         | [SHB]      |
| 65     |             | Unassigned                        | [JBP]      |
| 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]      |
| 72-75  |             | Unassigned                        | [JBP]      |
| 76     | BR-SAT-MON  | Backroom SATNET Monitoring        | [SHB]      |
| 77     | SUN-ND      | SUN ND PROTOCOL-Temporary         | [WM3]      |
| 78     | WB-MON      | WIDEBAND Monitoring               | [SHB]      |
| 79     | WB-EXPAK    | WIDEBAND EXPAK                    | [SHB]      |
| 80     | ISO-IP      | ISO Internet Protocol             | [MTR]      |
| 81     | VMTP        | VMTP                              | [DRC3]     |
| 82     | SECURE-VMTP | SECURE-VMTP                       | [DRC3]     |
| 83     | VINES       | VINES                             | [BXH]      |
| 84     | TTP         | TTP                               | [JXS]      |
| 85     | NSFNET-IGP  | NSFNET-IGP                        | [HWB]      |
| 86     | DGP         | Dissimilar Gateway Protocol       | [74,ML109] |
| 87     | TCF         | TCF                               | [GAL5]     |
| 88     | IGRP        | IGRP                              | [18,GXS]   |
| 89     | OSPFIGP     | OSPFIGP                           | [83,JTM4]  |
| 90     | Sprite-RPC  | Sprite RPC Protocol               | [143,BXW]  |
| 91     | LARP        | Locus Address Resolution Protocol | [BXH]      |
| 92-254 |             | Unassigned                        | [JBP]      |
| 255    |             | Reserved                          | [JBP]      |

## PORT NUMBERS

Ports are used in the TCP [45,106] to name the ends of logical connections which carry long term conversations. For the purpose of providing services to unknown callers, a service contact port is defined. This list specifies the port used by the server process as its contact port. The contact port is sometimes called the "well-known port".

To the extent possible, these same port assignments are used with the UDP [46,104].

To the extent possible, these same port assignments are used with the ISO-TP4 [64].

The assigned ports use a small portion of the possible port numbers. The assigned ports have all except the low order eight bits cleared to zero. The low order eight bits are specified here.

## Port Assignments:

| Decimal | Keyword    | Description                  | References |
|---------|------------|------------------------------|------------|
| -----   | -----      | -----                        | -----      |
| 0       |            | Reserved                     | [JBP]      |
| 1       | TCPMUX     | TCP Port Service Multiplexer | [MKL]      |
| 2-4     |            | Unassigned                   | [JBP]      |
| 5       | RJE        | Remote Job Entry             | [12,JBP]   |
| 7       | ECHO       | Echo                         | [95,JBP]   |
| 9       | DISCARD    | Discard                      | [94,JBP]   |
| 11      | USERS      | Active Users                 | [89,JBP]   |
| 13      | DAYTIME    | Daytime                      | [93,JBP]   |
| 15      |            | Unassigned                   | [JBP]      |
| 17      | QUOTE      | Quote of the Day             | [100,JBP]  |
| 19      | CHARGEN    | Character Generator          | [92,JBP]   |
| 20      | FTP-DATA   | File Transfer [Default Data] | [96,JBP]   |
| 21      | FTP        | File Transfer [Control]      | [96,JBP]   |
| 23      | TELNET     | Telnet                       | [112,JBP]  |
| 25      | SMTP       | Simple Mail Transfer         | [102,JBP]  |
| 27      | NSW-FE     | NSW User System FE           | [24,RHT]   |
| 29      | MSG-ICP    | MSG ICP                      | [85,RHT]   |
| 31      | MSG-AUTH   | MSG Authentication           | [85,RHT]   |
| 33      | DSP        | Display Support Protocol     | [EXC]      |
| 35      |            | any private printer server   | [JBP]      |
| 37      | TIME       | Time                         | [108,JBP]  |
| 39      | RLP        | Resource Location Protocol   | [MA]       |
| 41      | GRAPHICS   | Graphics                     | [129,JBP]  |
| 42      | NAMESERVER | Host Name Server             | [99,JBP]   |
| 43      | NICNAME    | Who Is                       | [55,MARY]  |

|     |            |                                    |             |
|-----|------------|------------------------------------|-------------|
| 44  | MPM-FLAGS  | MPM FLAGS Protocol                 | [JBP]       |
| 45  | MPM        | Message Processing Module [recv]   | [98,JBP]    |
| 46  | MPM-SND    | MPM [default send]                 | [98,JBP]    |
| 47  | NI-FTP     | NI FTP                             | [134,SK8]   |
| 49  | LOGIN      | Login Host Protocol                | [PHD1]      |
| 51  | LA-MAINT   | IMP Logical Address Maintenance    | [76,AGM]    |
| 53  | DOMAIN     | Domain Name Server                 | [81,95,PM1] |
| 55  | ISI-GL     | ISI Graphics Language              | [7,RB9]     |
| 57  |            | any private terminal access        | [JBP]       |
| 59  |            | any private file service           | [JBP]       |
| 61  | NI-MAIL    | NI MAIL                            | [5,SK8]     |
| 63  | VIA-FTP    | VIA Systems - FTP                  | [DXD]       |
| 65  | TACACS-DS  | TACACS-Database Service            | [3,KH43]    |
| 67  | BOOTPS     | Bootstrap Protocol Server          | [36,WJC2]   |
| 68  | BOOTPC     | Bootstrap Protocol Client          | [36,WJC2]   |
| 69  | TFTP       | Trivial File Transfer              | [126,DDC1]  |
| 71  | NETRJS-1   | Remote Job Service                 | [10,RTB3]   |
| 72  | NETRJS-2   | Remote Job Service                 | [10,RTB3]   |
| 73  | NETRJS-3   | Remote Job Service                 | [10,RTB3]   |
| 74  | NETRJS-4   | Remote Job Service                 | [10,RTB3]   |
| 75  |            | any private dial out service       | [JBP]       |
| 77  |            | any private RJE service            | [JBP]       |
| 79  | FINGER     | Finger                             | [52,KLH]    |
| 81  | HOSTS2-NS  | HOSTS2 Name Server                 | [EAK1]      |
| 83  | MIT-ML-DEV | MIT ML Device                      | [DPR]       |
| 85  | MIT-ML-DEV | MIT ML Device                      | [DPR]       |
| 87  |            | any private terminal link          | [JBP]       |
| 89  | SU-MIT-TG  | SU/MIT Telnet Gateway              | [MRC]       |
| 91  | MIT-DOV    | MIT Dover Spooler                  | [EBM]       |
| 93  | DCP        | Device Control Protocol            | [DT15]      |
| 95  | SUPDUP     | SUPDUP                             | [27,MRC]    |
| 97  | SWIFT-RVF  | Swift Remote Vitural File Protocol | [MXR]       |
| 98  | TACNEWS    | TAC News                           | [ANM2]      |
| 99  | METAGRAM   | Metagram Relay                     | [GEOF]      |
| 101 | HOSTNAME   | NIC Host Name Server               | [54,MARY]   |
| 102 | ISO-TSAP   | ISO-TSAP                           | [16,MTR]    |
| 103 | X400       | X400                               | [HCF2]      |
| 104 | X400-SND   | X400-SND                           | [HCF2]      |
| 105 | CSNET-NS   | Mailbox Name Nameserver            | [127,MS56]  |
| 107 | RTELNET    | Remote Telnet Service              | [101,JBP]   |
| 109 | POP2       | Post Office Protocol - Version 2   | [14,JKR1]   |
| 110 | POP3       | Post Office Protocol - Version 3   | [122,MTR]   |
| 111 | SUNRPC     | SUN Remote Procedure Call          | [DXG]       |
| 113 | AUTH       | Authentication Service             | [130,MCSJ]  |
| 115 | SFTP       | Simple File Transfer Protocol      | [73,MKL1]   |
| 117 | UUCP-PATH  | UUCP Path Service                  | [44,MAE]    |
| 119 | NNTP       | Network News Transfer Protocol     | [65,PL4]    |
| 121 | ERPC       | Encore Expedited Remote Proc. Call | [132,JXO]   |

|     |             |                                   |            |
|-----|-------------|-----------------------------------|------------|
| 123 | NTP         | Network Time Protocol             | [80,DLM1]  |
| 125 | LOCUS-MAP   | Locus PC-Interface Net Map Server | [137,EP53] |
| 127 | LOCUS-CON   | Locus PC-Interface Conn Server    | [137,EP53] |
| 129 | PWDGEN      | Password Generator Protocol       | [141,FJW]  |
| 130 | CISCO-FNA   | CISCO FNATIVE                     | [WXB]      |
| 131 | CISCO-TNA   | CISCO TNATIVE                     | [WXB]      |
| 132 | CISCO-SYS   | CISCO SYSMAINT                    | [WXB]      |
| 133 | STATSRV     | Statistics Service                | [DLM1]     |
| 134 | INGRES-NET  | INGRES-NET Service                | [MXB]      |
| 135 | LOC-SRV     | Location Service                  | [JXP]      |
| 136 | PROFILE     | PROFILE Naming System             | [LLP]      |
| 137 | NETBIOS-NS  | NETBIOS Name Service              | [JBP]      |
| 138 | NETBIOS-DGM | NETBIOS Datagram Service          | [JBP]      |
| 139 | NETBIOS-SSN | NETBIOS Session Service           | [JBP]      |
| 140 | EMFIS-DATA  | EMFIS Data Service                | [GB7]      |
| 141 | EMFIS-CNTL  | EMFIS Control Service             | [GB7]      |
| 142 | BL-IDM      | Britton-Lee IDM                   | [SXS1]     |
| 143 | IMAP2       | Interim Mail Access Protocol v2   | [MRC]      |
| 144 | NEWS        | News                              | [JAG]      |
| 145 | UAAC        | UAAC Protocol                     | [DAG4]     |
| 146 | ISO-TP0     | ISO-IP0                           | [86,MTR]   |
| 147 | ISO-IP      | ISO-IP                            | [MTR]      |
| 148 | CRONUS      | CRONUS-SUPPORT                    | [135,JXB]  |
| 149 | AED-512     | AED 512 Emulation Service         | [AXB]      |
| 150 | SQL-NET     | SQL-NET                           | [MXP]      |
| 151 | HEMS        | HEMS                              | [87,CXT]   |
| 152 | BFTP        | Background File Transfer Program  | [AD14]     |
| 153 | SGMP        | SGMP                              | [37,MS9]   |
| 154 | NETSC-PROD  | NETSC                             | [SH37]     |
| 155 | NETSC-DEV   | NETSC                             | [SH37]     |
| 156 | SQLSRV      | SQL Service                       | [CMR]      |
| 157 | KNET-CMP    | KNET/VM Command/Message Protocol  | [77,GSM11] |
| 158 | PCMail-SRV  | PCMail Server                     | [19,MXL]   |
| 159 | NSS-Routing | NSS-Routing                       | [JXR]      |
| 160 | SGMP-TRAPS  | SGMP-TRAPS                        | [37,MS9]   |
| 161 | SNMP        | SNMP                              | [15,MTR]   |
| 162 | SNMPTRAP    | SNMPTRAP                          | [15,MTR]   |
| 163 | CMIP-Manage | CMIP/TCP Manager                  | [4,AXB1]   |
| 164 | CMIP-Agent  | CMIP/TCP Agent                    | [4,AXB1]   |
| 165 | XNS-Courier | Xerox                             | [144,SXA]  |
| 166 | S-Net       | Sirius Systems                    | [BXL]      |
| 167 | NAMP        | NAMP                              | [MS9]      |
| 168 | RSVD        | RSVD                              | [NT12]     |
| 169 | SEND        | SEND                              | [WDW11]    |
| 170 | Print-SRV   | Network PostScript                | [BKR]      |
| 171 | Multiplex   | Network Innovations Multiplex     | [KXD]      |
| 172 | CL/1        | Network Innovations CL/1          | [KXD]      |
| 173 | Xyplex-MUX  | Xyplex                            | [BXS]      |

|         |             |   |           |
|---------|-------------|---|-----------|
| 174     | MAILQ       | MAILQ                                   | [RXZ]     |
| 175     | VMNET       | VMNET                                   | [CXT]     |
| 176     | GENRAD-MUX  | GENRAD-MUX                              | [RXT]     |
| 177     | XDMCP       | X Display Manager Control Protocol      | [RWS4]    |
| 178     | NextStep    | NextStep Window Server                  | [LXH]     |
| 179     | BGP         | Border Gateway Protocol                 | [KSL]     |
| 180     | RIS         | Intergraph                              | [DXB]     |
| 181     | Unify       | Unify                                   | [VXS]     |
| 182     | Unisys-Cam  | Unisys-Cam                              | [GXG]     |
| 183     | OCBinder    | OCBinder                                | [JX01]    |
| 184     | OCServer    | OCServer                                | [JX01]    |
| 185     | Remote-KIS  | Remote-KIS                              | [RXD1]    |
| 186     | KIS         | KIS Protocol                            | [RXD1]    |
| 187     | ACI         | Application Communication Interface     | [RXC1]    |
| 188     | MUMPS       | MUMPS                                   | [HS23]    |
| 189     | QFT         | Queued File Transport                   | [WXS]     |
| 190     | GACP        | Gateway Access Control Protocol         | [PCW]     |
| 191     | Prospero    | Prospero                                | [BCN]     |
| 192     | OSU-NMS     | OSU Network Monitoring System           | [DXK]     |
| 193     | SRMP        | Spider Remote Monitoring Protocol       | [TXS]     |
| 194     | IRC         | Internet Relay Chat Protocol            | [JX02]    |
| 195     | DN6-NLM-AUD | DNSIX Network Level Module Audit        | [LL69]    |
| 196     | DN6-SMM-RED | DNSIX Session Mgt Module Audit Redirect | [LL69]    |
| 197     | DLS         | Directory Location Service              | [SXB]     |
| 198     | DLS-Mon     | Directory Location Service Monitor      | [SXB]     |
| 198-200 |             | Unassigned                              | [JBP]     |
| 201     | AT-RMTP     | AppleTalk Routing Maintenance           | [RXC]     |
| 202     | AT-NBP      | AppleTalk Name Binding                  | [RXC]     |
| 203     | AT-3        | AppleTalk Unused                        | [RXC]     |
| 204     | AT-ECHO     | AppleTalk Echo                          | [RXC]     |
| 205     | AT-5        | AppleTalk Unused                        | [RXC]     |
| 206     | AT-ZIS      | AppleTalk Zone Information              | [RXC]     |
| 207     | AT-7        | AppleTalk Unused                        | [RXC]     |
| 208     | AT-8        | AppleTalk Unused                        | [RXC]     |
| 209-223 |             | Unassigned                              | [JBP]     |
| 224-241 |             | Reserved                                | [JBP]     |
| 243     | SUR-MEAS    | Survey Measurement                      | [6,DDC1]  |
| 245     | LINK        | LINK                                    | [1,RDB2]  |
| 246     | DSP3270     | Display Systems Protocol                | [39,WJS1] |
| 247-255 |             | Reserved                                | [JBP]     |

## UNIX PORTS

By convention, ports in the range 256 to 1024 are used for "Unix Standard" services. Listed here are some of the normal uses of these port numbers.

| Service Name | Port/Protocol | Description                  |
|--------------|---------------|------------------------------|
| -----        | -----         | -----                        |
| echo         | 7/tcp         |                              |
| discard      | 9/tcp         | sink null                    |
| systat       | 11/tcp        | users                        |
| daytime      | 13/tcp        |                              |
| netstat      | 15/tcp        |                              |
| qotd         | 17/tcp        | quote                        |
| chargen      | 19/tcp        | ttytst source                |
| ftp-data     | 20/tcp        |                              |
| ftp          | 21/tcp        |                              |
| telnet       | 23/tcp        |                              |
| smtp         | 25/tcp        | mail                         |
| time         | 37/tcp        | timserver                    |
| name         | 42/tcp        | nameserver                   |
| whois        | 43/tcp        | nicname                      |
| nameserver   | 53/tcp        | domain                       |
| apts         | 57/tcp        | any private terminal service |
| apfs         | 59/tcp        | any private file service     |
| rje          | 77/tcp        | netrjs                       |
| finger       | 79/tcp        |                              |
| link         | 87/tcp        | ttylink                      |
| supdup       | 95/tcp        |                              |
| newacct      | 100/tcp       | [unauthorized use]           |
| hostnames    | 101/tcp       | hostname                     |
| iso-tsap     | 102/tcp       | tsap                         |
| x400         | 103/tcp       |                              |
| x400-snd     | 104/tcp       |                              |
| csnet-ns     | 105/tcp       | CSNET Name Service           |
| pop-2        | 109/tcp       | pop postoffice               |
| sunrpc       | 111/tcp       |                              |
| auth         | 113/tcp       | authentication               |
| sftp         | 115/tcp       |                              |
| uucp-path    | 117/tcp       |                              |
| nntp         | 119/tcp       | usenet readnews untp         |
| ntp          | 123/tcp       | network time protocol        |
| statsrv      | 133/tcp       |                              |
| profile      | 136/tcp       |                              |
| NeWS         | 144/tcp       | news                         |
| print-srv    | 170/tcp       |                              |
| exec         | 512/tcp       | remote process execution;    |

|            |         |  |
|------------|---------|--|
| login      | 513/tcp | authentication performed using<br>passwords and UNIX login names<br>remote login a la telnet;<br>automatic authentication performed<br>based on privileged port numbers<br>and distributed data bases which<br>identify "authentication domains" |
| cmd        | 514/tcp | like exec, but automatic<br>authentication is performed as for<br>login server   |
| printer    | 515/tcp | spooler  |
| efs        | 520/tcp | extended file name server  |
| tempo      | 526/tcp | newdate  |
| courier    | 530/tcp | rpc  |
| conference | 531/tcp | chat   |
| netnews    | 532/tcp | readnews   |
| uucp       | 540/tcp | uucpd  |
| klogin     | 543/tcp |  |
| kshell     | 544/tcp | krcmd  |
| dsf        | 555/tcp |  |
| remotefs   | 556/tcp | rfs server   |
| chshell    | 562/tcp | chcmd  |
| meter      | 570/tcp | demon  |
| pcserver   | 600/tcp | Sun IPC server   |
| nqs        | 607/tcp | nqs  |
| mdqs       | 666/tcp |  |
| rfile      | 750/tcp |  |
| pump       | 751/tcp |  |
| qrh        | 752/tcp |  |
| rrh        | 753/tcp |  |
| tell       | 754/tcp | send   |
| nlogin     | 758/tcp |  |
| con        | 759/tcp |  |
| ns         | 760/tcp |  |
| rx         | 761/tcp |  |
| quotad     | 762/tcp |  |
| cycleserv  | 763/tcp |  |
| omserv     | 764/tcp |  |
| webster    | 765/tcp |  |
| phonebook  | 767/tcp | phone  |
| vid        | 769/tcp |  |
| rtip       | 771/tcp |  |
| cycleserv2 | 772/tcp |  |
| submit     | 773/tcp |  |
| rpasswd    | 774/tcp |  |
| entomb     | 775/tcp |  |
| wpages     | 776/tcp |  |
| wpgs       | 780/tcp |  |

|                          |          |                           |
|--------------------------|----------|---------------------------|
| mdb <sub>s</sub> _daemon | 800/tcp  |                           |
| device                   | 801/tcp  |                           |
| maitrd                   | 997/tcp  |                           |
| busboy                   | 998/tcp  |                           |
| garcon                   | 999/tcp  |                           |
| blackjack                | 1025/tcp | network blackjack         |
| bbn-mm <sub>c</sub>      | 1347/tcp | multi media conferencing  |
| bbn-mm <sub>x</sub>      | 1348/tcp | multi media conferencing  |
| orasrv                   | 1525/tcp | oracle                    |
| ingreslock               | 1524/tcp |                           |
| issd                     | 1600/tcp |                           |
| nkd                      | 1650/tcp |                           |
| dc                       | 2001/tcp |                           |
| mailbox                  | 2004/tcp |                           |
| berknet                  | 2005/tcp |                           |
| invokator                | 2006/tcp |                           |
| dectalk                  | 2007/tcp |                           |
| conf                     | 2008/tcp |                           |
| news                     | 2009/tcp |                           |
| search                   | 2010/tcp |                           |
| raid-cc                  | 2011/tcp | raid                      |
| ttyinfo                  | 2012/tcp |                           |
| raid-am                  | 2013/tcp |                           |
| troff                    | 2014/tcp |                           |
| cypress                  | 2015/tcp |                           |
| cypress-stat             | 2017/tcp |                           |
| terminaldb               | 2018/tcp |                           |
| whosockami               | 2019/tcp |                           |
| servexec                 | 2021/tcp |                           |
| down                     | 2022/tcp |                           |
| ellpack                  | 2025/tcp |                           |
| shadowserver             | 2027/tcp |                           |
| submitserver             | 2028/tcp |                           |
| device2                  | 2030/tcp |                           |
| blackboard               | 2032/tcp |                           |
| glogger                  | 2033/tcp |                           |
| scoremgr                 | 2034/tcp |                           |
| imsldoc                  | 2035/tcp |                           |
| objectmanager            | 2038/tcp |                           |
| lam                      | 2040/tcp |                           |
| interbase                | 2041/tcp |                           |
| isis                     | 2042/tcp |                           |
| rimsl                    | 2044/tcp |                           |
| dls                      | 2047/tcp |                           |
| dls-monitor              | 2048/tcp |                           |
| shilp                    | 2049/tcp |                           |
| NSWS                     | 3049/tcp |                           |
| rfa                      | 4672/tcp | remote file access server |

|              |          |   |
|--------------|----------|---|
| complex-main | 5000/tcp |   |
| complex-link | 5001/tcp |   |
| padl2sim     | 5236/tcp |   |
| man          | 9535/tcp |   |
| echo         | 7/udp    |   |
| discard      | 9/udp    | sink null   |
| systat       | 11/udp   | users   |
| daytime      | 13/udp   |   |
| netstat      | 15/udp   |   |
| qotd         | 17/udp   | quote   |
| chargen      | 19/udp   | ttytst source   |
| time         | 37/udp   | timserver   |
| rlp          | 39/udp   | resource  |
| name         | 42/udp   | nameserver  |
| whois        | 43/udp   | nickname  |
| nameserver   | 53/udp   | domain  |
| bootps       | 67/udp   | bootp   |
| bootpc       | 68/udp   |   |
| tftp         | 69/udp   |   |
| sunrpc       | 111/udp  |   |
| erpc         | 121/udp  |   |
| ntp          | 123/udp  |   |
| statsrv      | 133/udp  |   |
| profile      | 136/udp  |   |
| snmp         | 161/udp  |   |
| snmp-trap    | 162/udp  |   |
| at-rtmp      | 201/udp  |   |
| at-nbp       | 202/udp  |   |
| at-3         | 203/udp  |   |
| at-echo      | 204/udp  |   |
| at-5         | 205/udp  |   |
| at-zis       | 206/udp  |   |
| at-7         | 207/udp  |   |
| at-8         | 208/udp  |   |
| biff         | 512/udp  | used by mail system to notify users<br>of new mail received; currently<br>receives messages only from<br>processes on the same machine        |
| who          | 513/udp  | maintains data bases showing who's<br>logged in to machines on a local<br>net and the load average of the<br>machine                          |
| syslog       | 514/udp  |   |
| talk         | 517/udp  | like tenex link, but across<br>machine - unfortunately, doesn't<br>use link protocol (this is actually<br>just a rendezvous port from which a |

|                |          |  |
|----------------|----------|--|
| ntalk          | 518/udp  | tcp connection is established)   |
| utime          | 519/udp  | unixtime   |
| router         | 520/udp  | local routing process (on site);<br>uses variant of Xerox NS routing<br>information protocol |
| timed          | 525/udp  | timeserver   |
| netwall        | 533/udp  | for emergency broadcasts   |
| new-rwho       | 550/udp  | new-who  |
| rmonitor       | 560/udp  | rmonitord  |
| monitor        | 561/udp  |  |
| meter          | 571/udp  | udemon   |
| elcsd          | 704/udp  | errlog copy/server daemon  |
| loadav         | 750/udp  |  |
| vid            | 769/udp  |  |
| cadlock        | 770/udp  |  |
| notify         | 773/udp  |  |
| acmaint_dbd    | 774/udp  |  |
| acmaint_transd | 775/udp  |  |
| wpages         | 776/udp  |  |
| puparp         | 998/udp  |  |
| applix         | 999/udp  | Applix ac  |
| puprouter      | 999/udp  |  |
| cadlock        | 1000/udp |  |
| hermes         | 1248/udp |  |
| wizard         | 2001/udp | curry  |
| globe          | 2002/udp |  |
| emce           | 2004/udp | CCWS mm conf   |
| oracle         | 2005/udp |  |
| raid-cc        | 2006/udp | raid   |
| raid-am        | 2007/udp |  |
| terminaldb     | 2008/udp |  |
| whosockami     | 2009/udp |  |
| pipe_server    | 2010/udp |  |
| servserv       | 2011/udp |  |
| raid-ac        | 2012/udp |  |
| raid-cd        | 2013/udp |  |
| raid-sf        | 2014/udp |  |
| raid-cs        | 2015/udp |  |
| bootserver     | 2016/udp |  |
| bootclient     | 2017/udp |  |
| rellpack       | 2018/udp |  |
| about          | 2019/udp |  |
| xinupageserver | 2020/udp |  |
| xinuexpansion1 | 2021/udp |  |
| xinuexpansion2 | 2022/udp |  |
| xinuexpansion3 | 2023/udp |  |
| xinuexpansion4 | 2024/udp |  |

|                 |           |
|-----------------|-----------|
| xribs           | 2025/udp  |
| scrabble        | 2026/udp  |
| isis            | 2042/udp  |
| isis-bcast      | 2043/udp  |
| rimsl           | 2044/udp  |
| cdfunc          | 2045/udp  |
| sdfunc          | 2046/udp  |
| dls             | 2047/udp  |
| shilp           | 2049/udp  |
| rmonitor_secure | 5145/udp  |
| xdsxdm          | 6558/udp  |
| isode-dua       | 17007/udp |

## INTERNET MULTICAST ADDRESSES

Host Extensions for IP Multicasting (RFC-1112) [43] specifies the extensions required of a host implementation of the Internet Protocol (IP) to support multicasting. Current addresses are listed below.

|                       |  |           |
|-----------------------|--|-----------|
| 224.0.0.0             | Reserved                               | [43,JBP]  |
| 224.0.0.1             | All Hosts on this Subnet               | [43,JBP]  |
| 224.0.0.2             | All Gateways on this Subnet (proposed) | [JBP]     |
| 224.0.0.3             | Unassigned                             | [JBP]     |
| 224.0.0.4             | DVMRP Routers                          | [140,JBP] |
| 224.0.0.5             | OSPFIGP OSPFIGP All Routers            | [83,JXM1] |
| 224.0.0.6             | OSPFIGP OSPFIGP Designated Routers     | [83,JXM1] |
| 224.0.0.7-244.0.0.255 | Unassigned                             | [JBP]     |
| 224.0.1.0             | VMTP Managers Group                    | [17,DRC3] |
| 224.0.1.1             | NTP Network Time Protocol              | [80,DLM1] |
| 224.0.1.2             | SGI-Dogfight                           | [AXC]     |
| 224.0.1.3             | Rwhod                                  | [SXD]     |
| 224.0.1.4             | VNP                                    | [DRC3]    |
| 244.0.1.5-244.0.1.255 | Unassigned                             | [JBP]     |
| 224.0.2.1             | "rwho" Group (BSD) (unofficial)        | [JBP]     |
| 232.x.x.x             | VMTP transient groups                  | [17,DRC3] |

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

## IANA ETHERNET ADDRESS BLOCK

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

The address block in IEEE binary is (which is in bit transmission order):

0000 0000 0000 0000 0111 1010

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

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

IEEE Token Ring bit transmission order: 00 00 7A

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

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

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

|                               |                               |                                     |
|-------------------------------|-------------------------------|-------------------------------------|
| 0                             | 23                            | 47                                  |
|                               |                               |                                     |
| 0000 0001 0000 0000 0101 1110 | 0xxx xxxx xxxx xxxx xxxx xxxx |                                     |
|                               |                               |                                     |
| Multicast Bit                 | 0 = Internet Multicast        | 1 = Assigned by IANA for other uses |

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

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

1.0.94.0.0.0 to 1.0.94.127.255.255 in dotted decimal

## IP TOS PARAMETERS

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

There are three binary TOS attributes: low delay, high throughput, and high reliability; in each case, an attribute bit is turned on to indicate "better". The three attributes cannot all be optimized simultaneously, and in fact the TOS algorithms that have been discussed tend to make "better" values of the attributes mutually exclusive. Therefore, the recommended values have at most one bit on.

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 (1 0 0) or high throughput (0 1 0).

The following are recommended values for TOS:

| ----- Type-of-Service Value ----- |              |                    |                     |
|-----------------------------------|--------------|--------------------|---------------------|
| Protocol                          | Low<br>Delay | High<br>Throughput | High<br>Reliability |
| TELNET (1)                        | 1            | 0                  | 0                   |
| FTP                               |              |                    |                     |
| Control                           | 1            | 0                  | 0                   |
| Data (2)                          | 0            | 1                  | 0                   |
| TFTP                              | 1            | 0                  | 0                   |
| SMTP (3)                          |              |                    |                     |
| Cmd phase                         | 1            | 0                  | 0                   |
| DATA phase                        | 0            | 1                  | 0                   |
| Domain Name Service               |              |                    |                     |
| UDP Query                         | 1            | 0                  | 0                   |
| TCP Query                         | 0            | 0                  | 0                   |
| Zone Tnsfr                        | 0            | 1                  | 0                   |
| NNTP                              | 0            | 0                  | 0                   |

|         |   |   |   |
|---------|---|---|---|
| ICMP    |   |   |   |
| Errors  | 0 | 0 | 0 |
| Queries | 0 | 0 | 0 |
| Any IGP | 0 | 0 | 1 |
| EGP     | 0 | 0 | 0 |
| SNMP    | 0 | 0 | 1 |
| BOOTP   | 0 | 0 | 0 |

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 (0,0,0).

## IP TIME TO LIVE PARAMETER

The current recommended default TTL for the Internet Protocol (IP)  
RFC-791 [45,105] is 32.

## DOMAIN SYSTEM PARAMETERS

The Internet Domain Naming System (DOMAIN) includes several parameters. These are documented in RFC-1034, [81] and RFC-1035 [82]. The CLASS parameter is listed here. The per CLASS parameters are defined in separate RFCs as indicated.

## Domain System Parameters:

| Decimal | Name          | References |
|---------|---------------|------------|
| -----   | ----          | -----      |
| 0       | Reserved      | [PM1]      |
| 1       | Internet (IN) | [81, PM1]  |
| 2       | Unassigned    | [PM1]      |
| 3       | Chaos (CH)    | [PM1]      |
| 4       | Hessoid (HS)  | [PM1]      |
| 5-65534 | Unassigned    | [PM1]      |
| 65535   | Reserved      |            |

## BOOTP PARAMETERS

The Bootstrap Protocol (BOOTP) RFC-951 [36] describes an IP/UDP bootstrap protocol (BOOTP) which allows a diskless client machine to discover its own IP address, the address of a server host, and the name of a file to be loaded into memory and executed. The BOOTP Vendor Information Extensions RFC-1084 [117] proposes an addition to the Bootstrap Protocol (BOOTP).

Vendor Extensions are listed below:

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

## NETWORK MANAGEMENT PARAMETERS

For the management of hosts and gateways on the Internet a data structure for the information has been defined. This data structure should be used with any of several possible management protocols, such as the "Simple Network Management Protocol" (SNMP) RFC-1098 [15], or the "Common Management Information Protocol over TCP" (CMOT) [142].

The data structure is the "Structure and Identification of Management Information for TCP/IP-based Internets" (SMI) RFC-1065 [120], and the "Management Information Base for Network Management of TCP/IP-based Internets" (MIB) [121].

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

The older "Simple Gateway Monitoring Protocol" (SGMP) RFC-1028 [37] also defined a data structure. The parameter assignments used with SGMP are included here for historical completeness.

## SMI Network Management Experimental Codes:

Prefix: 1.3.6.1.3.

| Decimal<br>----- | Name<br>---- | Description<br>-----    | References<br>----- |
|------------------|--------------|-------------------------|---------------------|
| 0                | Reserved     |                         | [JKR1]              |
| 1                | CLNP         | ISO CLNP Objects        | [MTR]               |
| 2                | T1-Carrier   | T1 Carrier Objects      | [MTR]               |
| 3                | IEEE8023     | Ethernet-like Objects   | [MTR]               |
| 4                | IEEE8025     | Token Ring-like Objects | [MTR]               |

## SMI Network Management Private Enterprise Codes:

Prefix: 1.3.6.1.4.1.

| Decimal<br>----- | Name<br>---- | References<br>----- |
|------------------|--------------|---------------------|
| 0                | Reserved     | [JKR1]              |
| 1                | Proteon      | [GSM11]             |
| 2                | IBM          | [JXR]               |
| 3                | CMU          | [SXW]               |
| 4                | Unix         | [KXS]               |
| 5                | ACC          | [AB20]              |
| 6                | TWG          | [KZM]               |
| 7                | CAYMAN       | [BP52]              |
| 8                | NYSERNET     | [MS9]               |

|    |                                  |         |
|----|----------------------------------|---------|
| 9  | cisco                            | [GXS]   |
| 10 | NSC                              | [GS123] |
| 11 | HP                               | [RDXS]  |
| 12 | Epilogue                         | [KA4]   |
| 13 | U of Tennessee                   | [JDC20] |
| 14 | BBN                              | [RH6]   |
| 15 | Xylogics, Inc.                   | [JRL3]  |
| 16 | Unisys                           | [UXW]   |
| 17 | Canstar                          | [SXP]   |
| 18 | Wellfleet                        | [JCB1]  |
| 19 | TRW                              | [GGB2]  |
| 20 | MIT                              | [JR35]  |
| 21 | EON                              | [MXW]   |
| 22 | Spartacus                        | [YXK]   |
| 23 | Excelan                          | [RXB]   |
| 24 | Spider Systems                   | [VXW]   |
| 25 | NSFNET                           | [HWB]   |
| 26 | Hughes LAN Systems               | [AXC1]  |
| 27 | Intergraph                       | [SXC]   |
| 28 | Interlan                         | [FJK2]  |
| 29 | Vitalink Communications          | [FXB]   |
| 30 | Ulane                            | [BXA]   |
| 31 | NSWC                             | [SRN1]  |
| 32 | Santa Cruz Operation             | [KR35]  |
| 33 | Xyplex                           | [BXS]   |
| 34 | Cray                             | [HXE]   |
| 35 | Bell Northern Research           | [GXW]   |
| 36 | DEC                              | [RXB1]  |
| 37 | Touch                            | [BXB]   |
| 38 | Network Research Corp.           | [BXV]   |
| 39 | Baylor College of Medicine       | [SB98]  |
| 40 | NMFECC-LLNL                      | [SXH]   |
| 41 | SRI                              | [DW181] |
| 42 | Sun Microsystems                 | [DXY]   |
| 43 | 3Com                             | [TB6]   |
| 44 | CMC                              | [DXP]   |
| 45 | SynOptics                        | [BXB1]  |
| 46 | Cheyenne Software                | [RXH]   |
| 47 | Prime Computer                   | [MXS]   |
| 48 | MCNC/North Carolina Data Network | [KXW]   |
| 49 | Chipcom                          | [JXC]   |
| 50 | Optical Data Systems             | [JXF]   |
| 51 | gated                            | [JXH]   |
| 52 | Cabletron Systems                | [RXD]   |
| 53 | Apollo Computers                 | [JXB]   |
| 54 | DeskTalk Systems, Inc.           | [DXK]   |
| 55 | SSDS                             | [RXS]   |
| 56 | Castle Rock Computing            | [JXS1]  |

|    |  |         |
|----|--|---------|
| 57 | MIPS Computer Systems                    | [CXM]   |
| 58 | TGV, Inc.                                | [KAA]   |
| 59 | Silicon Graphics, Inc.                   | [RXJ]   |
| 60 | University of British Columbia           | [DXM]   |
| 61 | Merit                                    | [BXN]   |
| 62 | FiberCom                                 | [EXR]   |
| 63 | Apple Computer Inc                       | [JXH1]  |
| 64 | Gandalf                                  | [HXX]   |
| 65 | Dartmouth                                | [PXX]   |
| 66 | David Systems                            | [DXM]   |
| 67 | Reuter                                   | [BXZ]   |
| 68 | Cornell                                  | [DC126] |
| 69 | TMAC                                     | [MLS34] |
| 70 | Locus Computing Corp.                    | [AXS]   |
| 71 | NASA                                     | [SS92]  |
| 72 | Retix                                    | [AXM]   |
| 73 | Boeing                                   | [JXG]   |
| 74 | AT&T                                     | [AXC2]  |
| 75 | Ungermann-Bass                           | [DXM]   |
| 76 | Digital Analysis Corp.                   | [SXX]   |
| 77 | LAN Manager                              | [JXG1]  |
| 78 | Netlabs                                  | [JB478] |
| 79 | ICL                                      | [JXI]   |
| 80 | Auspex Systems                           | [BXE]   |
| 81 | Lannet Company                           | [EXR]   |
| 82 | Network Computing Devices                | [DM280] |
| 83 | Raycom Systems                           | [BXW1]  |
| 84 | Pirelli Focom Ltd.                       | [SXL]   |
| 85 | Datability Software Systems              | [LXF]   |
| 86 | Network Application Technology           | [YXW]   |
| 87 | LINK (Lokales Informatik-Netz Karlsruhe) | [GXS]   |
| 88 | NYU                                      | [BJR2]  |
| 89 | RND                                      | [RXN]   |
| 90 | InterCon Systems Corporation             | [AW90]  |

## SGMP Vendor Specific Codes:

Prefix: 1,255,

| Decimal | Name     | References |
|---------|----------|------------|
| -----   | ----     | -----      |
| 0       | Reserved | [JKR1]     |
| 1       | Proteon  | [JS18]     |
| 2       | IBM      | [JXR]      |
| 3       | CMU      | [SXW]      |
| 4       | Unix     | [MS9]      |
| 5       | ACC      | [AB20]     |
| 6       | TWG      | [MTR]      |

|        |            |        |
|--------|------------|--------|
| 7      | CAYMAN     | [BP52] |
| 8      | NYSERNET   | [MS9]  |
| 9      | cisco      | [GS2]  |
| 10     | BBN        | [RH6]  |
| 11     | Unassigned | [JKR1] |
| 12     | MIT        | [JR35] |
| 13-254 | Unassigned | [JKR1] |
| 255    | Reserved   | [JKR1] |

## ARPANET AND MILNET LOGICAL ADDRESSES

The ARPANET facility for "logical addressing" is described in RFC-878 [57] and RFC-1005 [109]. A portion of the possible logical addresses are reserved for standard uses.

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

## Logical Address Assignments:

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

## ARPANET AND MILNET LINK NUMBERS

The word "link" here refers to a field in the original ARPANET Host/IMP interface leader. The link was originally defined as an 8-bit field. Later specifications defined this field as the "message-id" with a length of 12 bits. The name link now refers to the high order 8 bits of this 12-bit message-id field. The Host/IMP interface is defined in BBN Report 1822 [2].

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

## Link Assignments:

| Decimal<br>----- | Description<br>-----             | References<br>----- |
|------------------|----------------------------------|---------------------|
| 0-63             | BBNCC Monitoring                 | [MB]                |
| 64-149           | Unassigned                       | [JBP]               |
| 150              | Xerox NS IDP                     | [133,XEROX]         |
| 151              | Unassigned                       | [JBP]               |
| 152              | PARC Universal Protocol          | [8,XEROX]           |
| 153              | TIP Status Reporting             | [JGH]               |
| 154              | TIP Accounting                   | [JGH]               |
| 155              | Internet Protocol [regular]      | [105,JBP]           |
| 156-158          | Internet Protocol [experimental] | [105,JBP]           |
| 159              | Figleaf Link                     | [JBW1]              |
| 160              | Blacker Local Network Protocol   | [DM28]              |
| 161-194          | Unassigned                       | [JBP]               |
| 195              | ISO-IP                           | [64,RXM]            |
| 196-247          | Experimental Protocols           | [JBP]               |
| 248-255          | Network Maintenance              | [JGH]               |

## ARPANET AND MILNET X.25 ADDRESS MAPPINGS

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

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

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

ZZZZ F IIIHHZZ (SS)

where:

ZZZZ = 0000      as required

F = 0            because the address is a physical address;

III              is a three decimal digit representation of  
"i", right-adjusted and padded with leading  
zeros if required;

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

ZZ = 00          and

(SS)             is optional

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

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

ZZZZ F RRRRRZZ (SS)

where:

ZZZZ = 0000      as required

F = 1            because the address is a logical address;

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

$$r = h * 256 + i$$

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

ZZ = 00          and

(SS)            is optional

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

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

## IEEE 802 NUMBERS OF INTEREST

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

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

## Assignments:

| Link Service Access Point |          |         | Description            | References |
|---------------------------|----------|---------|------------------------|------------|
| -----                     |          |         | -----                  | -----      |
| IEEE                      | Internet |         |                        |            |
| binary                    | binary   | decimal |                        |            |
| 00000000                  | 00000000 | 0       | Null LSAP              | [IEEE]     |
| 01000000                  | 00000010 | 2       | Indiv LLC Sublayer Mgt | [IEEE]     |
| 11000000                  | 00000011 | 3       | Group LLC Sublayer Mgt | [IEEE]     |
| 00100000                  | 00000100 | 4       | SNA Path Control       | [IEEE]     |
| 01100000                  | 00000110 | 6       | Reserved (DOD IP)      | [104, JBP] |
| 01110000                  | 00001110 | 14      | PROWAY-LAN             | [IEEE]     |
| 01110010                  | 01001110 | 78      | EIA-RS 511             | [IEEE]     |
| 01111010                  | 01011110 | 94      | ISI IP                 | [JBP]      |
| 01110001                  | 10001110 | 142     | PROWAY-LAN             | [IEEE]     |
| 01010101                  | 10101010 | 170     | SNAP                   | [IEEE]     |
| 01111111                  | 11111110 | 254     | ISO DIS 8473           | [64, JXJ]  |
| 11111111                  | 11111111 | 255     | Global DSAP            | [IEEE]     |

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

At an ad hoc special session on "IEEE 802 Networks and ARP", held during the TCP Vendors Workshop (August 1986), an approach to a consistent way to send DoD-IP datagrams and other IP related protocols (such as the Address Resolution Protocol (ARP)) on 802 networks was developed, using the SNAP extension (see RFC-1010 and RFC-1042 [90]).

## ETHERNET NUMBERS OF INTEREST

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

If you need an Ethernet type, contact the Xerox Corporation, Xerox Systems Institute, 475 Oakmead Parkway, Sunnyvale, CA 94086, Attn: Ms. Fonda Pallone, (408) 737-4652.

The following list is contributed unverified information from various sources.

## Assignments:

| Ethernet |           | Exp. Ethernet |       | Description               | References  |
|----------|-----------|---------------|-------|---------------------------|-------------|
| -----    |           | -----         |       | -----                     | -----       |
| decimal  | Hex       | decimal       | octal |                           |             |
| 000      | 0000-05DC | -             | -     | IEEE802.3 Length Field    | [XEROX]     |
| 257      | 0101-01FF | -             | -     | Experimental              | [XEROX]     |
| 512      | 0200      | 512           | 1000  | XEROX PUP (see 0A00)      | [8,XEROX]   |
| 513      | 0201      | -             | -     | PUP Addr Trans (see 0A01) | [XEROX]     |
| 1536     | 0600      | 1536          | 3000  | XEROX NS IDP              | [133,XEROX] |
| 2048     | 0800      | 513           | 1001  | DOD IP                    | [105,JBP]   |
| 2049     | 0801      | -             | -     | X.75 Internet             | [XEROX]     |
| 2050     | 0802      | -             | -     | NBS Internet              | [XEROX]     |
| 2051     | 0803      | -             | -     | ECMA Internet             | [XEROX]     |
| 2052     | 0804      | -             | -     | Chaosnet                  | [XEROX]     |
| 2053     | 0805      | -             | -     | X.25 Level 3              | [XEROX]     |
| 2054     | 0806      | -             | -     | ARP                       | [88,JBP]    |
| 2055     | 0807      | -             | -     | XNS Compatability         | [XEROX]     |
| 2076     | 081C      | -             | -     | Symbolics Private         | [DCP1]      |
| 2184     | 0888-088A | -             | -     | Xyplex                    | [XEROX]     |
| 2304     | 0900      | -             | -     | Ungermann-Bass net debugr | [XEROX]     |
| 2560     | 0A00      | -             | -     | Xerox IEEE802.3 PUP       | [XEROX]     |
| 2561     | 0A01      | -             | -     | PUP Addr Trans            | [XEROX]     |
| 2989     | 0BAD      | -             | -     | Banyan Systems            | [XEROX]     |
| 4096     | 1000      | -             | -     | Berkeley Trailer nego     | [XEROX]     |
| 4097     | 1001-100F | -             | -     | Berkeley Trailer encap/IP | [XEROX]     |
| 5632     | 1600      | -             | -     | Valid Systems             | [XEROX]     |
| 16962    | 4242      | -             | -     | PCS Basic Block Protocol  | [XEROX]     |
| 21000    | 5208      | -             | -     | BBN Simnet                | [XEROX]     |
| 24576    | 6000      | -             | -     | DEC Unassigned (Exp.)     | [XEROX]     |
| 24577    | 6001      | -             | -     | DEC MOP Dump/Load         | [XEROX]     |
| 24578    | 6002      | -             | -     | DEC MOP Remote Console    | [XEROX]     |
| 24579    | 6003      | -             | -     | DEC DECNET Phase IV Route | [XEROX]     |
| 24580    | 6004      | -             | -     | DEC LAT                   | [XEROX]     |
| 24581    | 6005      | -             | -     | DEC Diagnostic Protocol   | [XEROX]     |

|       |           |   |   |                          |            |
|-------|-----------|---|---|--------------------------|------------|
| 24582 | 6006      | - | - | DEC Customer Protocol    | [XEROX]    |
| 24583 | 6007      | - | - | DEC LAVC, SCA            | [XEROX]    |
| 24584 | 6008-6009 | - | - | DEC Unassigned           | [XEROX]    |
| 24586 | 6010-6014 | - | - | 3Com Corporation         | [XEROX]    |
| 28672 | 7000      | - | - | Ungermann-Bass download  | [XEROX]    |
| 28674 | 7002      | - | - | Ungermann-Bass dia/loop  | [XEROX]    |
| 28704 | 7020-7029 | - | - | LRT                      | [XEROX]    |
| 28720 | 7030      | - | - | Proteon                  | [XEROX]    |
| 28724 | 7034      | - | - | Cabletron                | [XEROX]    |
| 32771 | 8003      | - | - | Cronus VLN               | [131,DT15] |
| 32772 | 8004      | - | - | Cronus Direct            | [131,DT15] |
| 32773 | 8005      | - | - | HP Probe                 | [XEROX]    |
| 32774 | 8006      | - | - | Nestar                   | [XEROX]    |
| 32776 | 8008      | - | - | AT&T                     | [XEROX]    |
| 32784 | 8010      | - | - | Excelan                  | [XEROX]    |
| 32787 | 8013      | - | - | SGI diagnostics          | [AXC]      |
| 32788 | 8014      | - | - | SGI network games        | [AXC]      |
| 32789 | 8015      | - | - | SGI reserved             | [AXC]      |
| 32780 | 8016      | - | - | SGI bounce server        | [AXC]      |
| 32783 | 8019      | - | - | Apollo Computers         | [XEROX]    |
| 32815 | 802E      | - | - | Tymshare                 | [XEROX]    |
| 32816 | 802F      | - | - | Tigan, Inc.              | [XEROX]    |
| 32821 | 8035      | - | - | Reverse ARP              | [48,JXM]   |
| 32822 | 8036      | - | - | Aeonic Systems           | [XEROX]    |
| 32824 | 8038      | - | - | DEC LANBridge            | [XEROX]    |
| 32825 | 8039-803C | - | - | DEC Unassigned           | [XEROX]    |
| 32829 | 803D      | - | - | DEC Ethernet Encryption  | [XEROX]    |
| 32830 | 803E      | - | - | DEC Unassigned           | [XEROX]    |
| 32831 | 803F      | - | - | DEC LAN Traffic Monitor  | [XEROX]    |
| 32832 | 8040-8042 | - | - | DEC Unassigned           | [XEROX]    |
| 32836 | 8044      | - | - | Planning Research Corp.  | [XEROX]    |
| 32838 | 8046      | - | - | AT&T                     | [XEROX]    |
| 32839 | 8047      | - | - | AT&T                     | [XEROX]    |
| 32841 | 8049      | - | - | ExperData                | [XEROX]    |
| 32859 | 805B      | - | - | Stanford V Kernel exp.   | [XEROX]    |
| 32860 | 805C      | - | - | Stanford V Kernel prod.  | [XEROX]    |
| 32861 | 805D      | - | - | Evans & Sutherland       | [XEROX]    |
| 32864 | 8060      | - | - | Little Machines          | [XEROX]    |
| 32866 | 8062      | - | - | Counterpoint Computers   | [XEROX]    |
| 32869 | 8065-8066 | - | - | Univ. of Mass. @ Amherst | [XEROX]    |
| 32871 | 8067      | - | - | Veeco Integrated Auto.   | [XEROX]    |
| 32872 | 8068      | - | - | General Dynamics         | [XEROX]    |
| 32873 | 8069      | - | - | AT&T                     | [XEROX]    |
| 32874 | 806A      | - | - | Autophon                 | [XEROX]    |
| 32876 | 806C      | - | - | ComDesign                | [XEROX]    |
| 32877 | 806D      | - | - | Computgraphic Corp.      | [XEROX]    |
| 32878 | 806E-8077 | - | - | Landmark Graphics Corp.  | [XEROX]    |
| 32890 | 807A      | - | - | Matra                    | [XEROX]    |

|       |           |   |   |                           |         |
|-------|-----------|---|---|---------------------------|---------|
| 32891 | 807B      | - | - | Dansk Data Elektronik     | [XEROX] |
| 32892 | 807C      | - | - | Merit Internodal          | [HWB]   |
| 32893 | 807D-807F | - | - | Vitalink Communications   | [XEROX] |
| 32896 | 8080      | - | - | Vitalink TransLAN III     | [XEROX] |
| 32897 | 8081-8083 | - | - | Counterpoint Computers    | [XEROX] |
| 32923 | 809B      | - | - | Appletalk                 | [XEROX] |
| 32924 | 809C-809E | - | - | Datability                | [XEROX] |
| 32927 | 809F      | - | - | Spider Systems Ltd.       | [XEROX] |
| 32931 | 80A3      | - | - | Nixdorf Computers         | [XEROX] |
| 32932 | 80A4-80B3 | - | - | Siemens Gammasonics Inc.  | [XEROX] |
| 32960 | 80C0-80C3 | - | - | DCA Data Exchange Cluster | [XEROX] |
| 32966 | 80C6      | - | - | Pacer Software            | [XEROX] |
| 32967 | 80C7      | - | - | Applitek Corporation      | [XEROX] |
| 32968 | 80C8-80CC | - | - | Intergraph Corporation    | [XEROX] |
| 32973 | 80CD-80CE | - | - | Harris Corporation        | [XEROX] |
| 32974 | 80CF-80D2 | - | - | Taylor Instrument         | [XEROX] |
| 32979 | 80D3-80D4 | - | - | Rosemount Corporation     | [XEROX] |
| 32981 | 80D5      | - | - | IBM SNA Service on Ether  | [XEROX] |
| 32989 | 80DD      | - | - | Varian Associates         | [XEROX] |
| 32990 | 80DE-80DF | - | - | Integrated Solutions TRFS | [XEROX] |
| 32992 | 80E0-80E3 | - | - | Allen-Bradley             | [XEROX] |
| 32996 | 80E4-80F0 | - | - | Datability                | [XEROX] |
| 33010 | 80F2      | - | - | Retix                     | [XEROX] |
| 33011 | 80F3      | - | - | AppleTalk AARP (Kinetics) | [XEROX] |
| 33012 | 80F4-80F5 | - | - | Kinetics                  | [XEROX] |
| 33015 | 80F7      | - | - | Apollo Computer           | [XEROX] |
| 33023 | 80FF-8103 | - | - | Wellfleet Communications  | [XEROX] |
| 33031 | 8107-8109 | - | - | Symbolics Private         | [XEROX] |
| 33072 | 8130      | - | - | Waterloo Microsystems     | [XEROX] |
| 33073 | 8131      | - | - | VG Laboratory Systems     | [XEROX] |
| 33079 | 8137-8138 | - | - | Novell, Inc.              | [XEROX] |
| 33081 | 8139-813D | - | - | KTI                       | [XEROX] |
| 33100 | 814C      | - | - | SNMP                      | [JKR1]  |
| 36864 | 9000      | - | - | Loopback                  | [XEROX] |
| 36865 | 9001      | - | - | 3Com(Bridge) XNS Sys Mgmt | [XEROX] |
| 36866 | 9002      | - | - | 3Com(Bridge) TCP-IP Sys   | [XEROX] |
| 36867 | 9003      | - | - | 3Com(Bridge) loop detect  | [XEROX] |
| 65280 | FF00      | - | - | BBN VITAL-LanBridge cache | [XEROX] |

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

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

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

## ETHERNET VENDOR ADDRESS COMPONENTS

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

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

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

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

|        |   |
|--------|---|
| 00000C | Cisco   |
| 00000F | NeXT  |
| 000010 | Sytek   |
| 00001D | Cabletron   |
| 000020 | DIAB (Data Intdustriier AB)                             |
| 000022 | Visual Technology                                       |
| 00002A | TRW   |
| 00005A | S & Koch  |
| 00005E | IANA  |
| 000065 | Network General   |
| 00006B | MIPS  |
| 000077 | MIPS  |
| 00007A | Ardent  |
| 000089 | Cayman Systems Gatorbox                                 |
| 000093 | Proteon   |
| 00009F | Ameristar Technology                                    |
| 0000A2 | Wellfleet   |
| 0000A3 | Network Application Technology                          |
| 0000A6 | Network General (internal assignment, not for products) |
| 0000A7 | NCD X-terminals   |
| 0000A9 | Network Systems   |
| 0000AA | Xerox Xerox machines                                    |

|        |  |   |
|--------|--|---|
| 0000B3 | CIMLinc                                |   |
| 0000B7 | Dove                                   | Fastnet                                   |
| 0000BC | Allen-Bradley                          |   |
| 0000C0 | Western Digital                        |   |
| 0000C6 | HP Intelligent Networks Operation      | (formerly Eon Systems)                    |
| 0000C8 | Altos                                  |   |
| 0000C9 | Emulex                                 | Terminal Servers                          |
| 0000D7 | Dartmouth College                      | (NED Router)                              |
| 0000D8 | 3Com? Novell?                          | PS/2                                      |
| 0000DD | Gould                                  |   |
| 0000DE | Unigraph                               |   |
| 0000E2 | Acer Counterpoint                      |   |
| 0000EF | Alantec                                |   |
| 0000FD | High Level Hardware                    | (Orion, UK)                               |
| 000102 | BBN                                    | BBN internal usage (not registered)       |
| 001700 | Kabel                                  |   |
| 00802D | Xylogics, Inc.                         | Annex terminal servers                    |
| 00808C | Frontier Software Development          |   |
| 00AA00 | Intel                                  |   |
| 00DD00 | Ungermann-Bass                         |   |
| 00DD01 | Ungermann-Bass                         |   |
| 020701 | MICOM/Interlan                         | UNIBUS or QBUS machines, Apollo           |
| 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                                 |   |
| 080010 | AT&T                                   |   |
| 080011 | Tektronix, Inc.                        |   |
| 080014 | Excelan                                | BBN Butterfly, Masscomp, Silicon Graphics |
| 080017 | NSC                                    |   |
| 08001A | Data General                           |   |
| 08001B | Data General                           |   |
| 08001E | Apollo                                 |   |
| 080020 | Sun                                    | Sun machines                              |
| 080022 | NBI                                    |   |
| 080025 | CDC                                    |   |
| 080026 | Norsk Data (Nord)                      |   |
| 080027 | PCS Computer Systems GmbH              |   |
| 080028 | TI                                     | Explorer                                  |
| 08002B | DEC                                    |   |
| 08002E | Metaphor                               |   |

|        |                                  |  |
|--------|----------------------------------|--|
| 08002F | Prime Computer                   | Prime 50-Series LHC300                                   |
| 080036 | Intergraph                       | CAE stations   |
| 080037 | Fujitsu-Xerox                    |  |
| 080038 | Bull                             |  |
| 080039 | Spider Systems                   |  |
| 080041 | DCA Digital Comm. Assoc.         |  |
| 080045 | ????                             | (maybe Xylogics, but they claim not to know this number) |
| 080046 | Sony                             |  |
| 080047 | Sequent                          |  |
| 080049 | Univation                        |  |
| 08004C | Encore                           |  |
| 08004E | BICC                             |  |
| 080056 | Stanford University              |  |
| 080058 | ???                              | DECsystem-20   |
| 08005A | IBM                              |  |
| 080067 | Comdesign                        |  |
| 080068 | Ridge                            |  |
| 080069 | Silicon Graphics                 |  |
| 08006E | Excelan                          |  |
| 080075 | DDE (Danish Data Elektronik A/S) |  |
| 08007C | Vitalink                         | TransLAN III   |
| 080080 | XIOS                             |  |
| 080086 | Imagen/QMS                       |  |
| 080087 | Xyplex                           | terminal servers   |
| 080089 | Kinetics                         | AppleTalk-Ethernet interface                             |
| 08008B | Pyramid                          |  |
| 08008D | XyVision                         | XyVision machines  |
| 080090 | Retix Inc                        | Bridges  |
| 484453 | HDS ???                          |  |
| 800010 | AT&T                             | [misrepresentation of 080010?]                           |
| AA0000 | DEC                              | obsolete   |
| AA0001 | DEC                              | obsolete   |
| AA0002 | DEC                              | obsolete   |
| AA0003 | DEC                              | Global physical address for some DEC machines            |
| AA0004 | DEC                              | Local logical address for systems running DECNET         |

## ETHERNET MULTICAST ADDRESSES

| Ethernet<br>Address                     | Type<br>Field | Usage  |
|---|---------------|--|
| Multicast Addresses:                    |               |  |
| 01-00-5E-00-00-00-<br>01-00-5E-7F-FF-FF | 0800          | Internet Multicast (RFC-1112) [43]                       |
| 01-00-5E-80-00-00-<br>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 br                |
| idges)                                  |               | 1 packet per second, sent by the<br>designated LanBridge |
| 09-00-2B-02-00-00                       | ????          | DEC DNA Level 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 System 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-<br>09-00-56-FE-FF-FF | ????          | Stanford reserved  |
| 09-00-56-FF-00-00-<br>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)<br>Dump/Load Assistance  |
| AB-00-00-02-00-00  | 6002 | DEC Maintenance Operation Protocol (MOP)<br>Remote Console<br>1 System ID packet every 8-10 minutes,<br>by every:<br>DEC LanBridge<br>DEC DEUNA interface<br>DEC DELUA interface<br>DEC DEQNA interface (in a certain mode) |
| AB-00-00-03-00-00  | 6003 | DECNET Phase IV end node Hello packets<br>1 packet every 15 seconds, sent by  |
| each DECNET host   |      |   |
| AB-00-00-04-00-00  | 6003 | DECNET Phase IV Router Hello packets<br>1 packet every 15 seconds, sent by the  |
| DECNET router      |      |   |
| AB-00-00-05-00-00  | ???? | Reserved DEC  |
| through            |      |   |
| AB-00-03-FF-FF-FF  |      |   |
| AB-00-03-00-00-00  | 6004 | DEC Local Area Transport (LAT) - old  |
| AB-00-04-00-xx-xx  | ???? | Reserved DEC customer private use   |
| AB-00-04-01-xx-yy  | 6007 | DEC Local Area VAX Cluster groups<br>System Communication Architecture (SCA)  |
| CF-00-00-00-00-00  | 9000 | Ethernet Configuration Test protocol (Loo   |
| pback)             |      |   |
| Broadcast Address: |      |   |
| FF-FF-FF-FF-FF-FF  | 0600 | XNS packets, Hello or gateway search?<br>6 packets every 15 seconds, per XNS stati  |
| on                 |      |   |
| 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?<br>1 packets every 30 seconds, per VALID sta  |
| tion               |      |   |
| FF-FF-FF-FF-FF-FF  | 8035 | Reverse ARP   |
| FF-FF-FF-FF-FF-FF  | 807C | Merit Internodal (INP)  |
| FF-FF-FF-FF-FF-FF  | 809B | EtherTalk   |

## XNS PROTOCOL TYPES

## Assigned well-known socket numbers

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

## Assigned internet packet types

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

## PROTOCOL/TYPE FIELD ASSIGNMENTS

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

| \ upper<br>lower \ | DoD IP                 | PUP                    | NS IP                  |
|--------------------|------------------------|------------------------|------------------------|
| 3Mb Ethernet       | Type<br>1001<br>octal  | Type<br>1000<br>octal  | Type<br>3000<br>octal  |
| 10 Mb Ethernet     | Type<br>0800<br>hex    | Type<br>0200<br>hex    | Type<br>0600<br>hex    |
| ARPANET            | Link<br>155<br>decimal | Link<br>152<br>decimal | Link<br>150<br>decimal |

| \ upper<br>lower \ | DoD IP                | PUP                       | NS IP                     |
|--------------------|-----------------------|---------------------------|---------------------------|
| DoD IP             | X                     | Protocol<br>12<br>decimal | Protocol<br>22<br>decimal |
| PUP                | ?                     | X                         | ?                         |
| NS IP              | Type<br>13<br>decimal | Type<br>12<br>decimal     | X                         |

## PRONET 80 TYPE NUMBERS

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

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

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

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

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

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

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

## ADDRESS RESOLUTION PROTOCOL PARAMETERS

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

## Assignments:

## Operation Code (op)

- 1 REQUEST
- 2 REPLY

## Hardware Type (hrd)

| Type | Description                            | References |
|------|--|------------|
| ---- | -----                                  | -----      |
| 1    | Ethernet (10Mb)                        | [JBP]      |
| 2    | Experimental Ethernet (3Mb)            | [JBP]      |
| 3    | Amateur Radio AX.25                    | [PXX]      |
| 4    | Proteon ProNET Token Ring              | [JBP]      |
| 5    | Chaos                                  | [GXP]      |
| 6    | IEEE 802 Networks                      | [JBP]      |
| 7    | ARCNET                                 | [JBP]      |
| 8    | Hyperchannel                           | [JBP]      |
| 9    | Lanstar                                | [TU]       |
| 10   | Autonet Short Address                  | [MXB1]     |
| 11   | LocalTalk                              | [LXE]      |
| 12   | LocalNet (IBM PCNet or SYTEK LocalNET) | [JXM]      |

## Protocol Type (pro)

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

## REVERSE ADDRESS RESOLUTION PROTOCOL OPERATION CODES

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

Assignments:

Operation Code (op)

- 3 request Reverse
- 4 reply Reverse

## DYNAMIC REVERSE ARP

Assignments:

Operation Code (op)

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

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

## X.25 TYPE NUMBERS

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

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

| Call User Data (hex) | Protocol                    | Reference   |
|----------------------|-----------------------------|-------------|
| -----                | -----                       | -----       |
| 01                   | PAD                         | [GS2]       |
| C5                   | Blacker front-end descr dev | [AGM]       |
| CC                   | IP                          | [69, AGM] * |
| CD                   | ISO-IP                      | [AGM]       |

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

## PUBLIC DATA NETWORK NUMBERS

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

The numbers below are assigned for networks that are connected to the Internet, and for independent networks. These independent networks are marked with an asterisk preceding the number.

## 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              | [SA1]      |
| 014.000.000.015  | 2041-117-01000 00 | SHAPE               | [JFW]      |
| 014.000.000.016  | 2628-153-90075 00 | DFVLR4-X25          | [GB7]      |
| 014.000.000.017  | 3110-213-00032 00 | ISI-VAN-GW          | [JD21]     |
| 014.000.000.018  | 2624-522-80900 52 | FGAN-SIEMENS-X25    | [GB7]      |
| 014.000.000.019  | 2041-170-10000 00 | SHAPE-X25           | [JFW]      |
| 014.000.000.020  | 5052-737-20000 50 | UQNET               | [AXH]      |
| 014.000.000.021  | 3020-801-00057 50 | DMC-CRC1            | [VXT]      |
| 014.000.000.022  | 2624-522-80329 02 | FGAN-FGANFFMVAX-X25 | [GB7]      |
| *014.000.000.023 | 2624-589-00908 01 | ECRC-X25            | [PXD]      |
| 014.000.000.024  | 2342-905-24242 83 | UK-MOD-RSRE         | [JXE2]     |
| 014.000.000.025  | 2342-905-24242 82 | UK-VAN-RSRE         | [AXM]      |
| 014.000.000.026  | 2624-522-80329 05 | DFVLR SUN-X25       | [GB7]      |
| 014.000.000.027  | 2624-457-11015 90 | SELETFMSUN-X25      | [BXD]      |
| 014.000.000.028  | 3110-408-00146 00 | CDC-SVL             | [RAM57]    |
| 014.000.000.029  | 2222-551-04400 00 | SUN-CNUCE           | [ABB2]     |
| 014.000.000.030  | 2222-551-04500 00 | ICNUCEVM-CNUCE      | [ABB2]     |
| 014.000.000.031  | 2222-551-04600 00 | SPARE-CNUCE         | [ABB2]     |
| 014.000.000.032  | 2222-551-04700 00 | ICNUCEVX-CNUCE      | [ABB2]     |
| 014.000.000.033  | 2222-551-04524 00 | CISCO-CNUCE         | [ABB2]     |

|                                 |                |    |               |        |
|---------------------------------|----------------|----|---------------|--------|
| 014.000.000.034                 | 2342-313-00260 | 90 | SPIDER-GW     | [AD67] |
| 014.000.000.035                 | 2342-313-00260 | 91 | SPIDER-EXP    | [AD67] |
| 014.000.000.036                 | 2342-225-00101 | 22 | PRAXIS-X25A   | [TXR]  |
| 014.000.000.037                 | 2342-225-00101 | 23 | PRAXIS-X25B   | [TXR]  |
| 014.000.000.038                 | 2403-712-30250 | 00 | DIAB-TABY-GW  | [FXB]  |
| 014.000.000.039                 | 2403-715-30100 | 00 | DIAB-LKP-GW   | [FXB]  |
| 014.000.000.040                 | 2401-881-24038 | 00 | DIAB-TABY1-GW | [FXB]  |
| 014.000.000.041                 | 2041-170-10060 | 00 | STC           | [TC27] |
| 014.000.000.042-014.255.255.254 |                |    | Unassigned    | [JBP]  |
| 014.255.255.255                 |                |    | Reserved      | [JBP]  |

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

## TELNET OPTIONS

The Telnet Protocol has a number of options that may be negotiated. These options are listed here. "Official Internet Protocols" [118] provides more detailed information.

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

## MAIL ENCRYPTION TYPES

RFC-822 specifies that Encryption Types for mail may be assigned. There are currently no RFC-822 encryption types assigned. Please use instead the Mail Privacy procedures defined in [71,72,66].

## MACHINE NAMES

These are the Official Machine Names as they appear in the Domain Name System WKS records and the NIC Host Table. Their use is described in RFC-952 [53].

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

|                  |                    |
|------------------|--------------------|
| ALTO             | DEC-1090           |
| ALTOS-6800       | DEC-1090B          |
| AMDAHL-V7        | DEC-1090T          |
| APOLLO           | DEC-2020T          |
| ATARI-104ST      | DEC-2040           |
| ATT-3B1          | DEC-2040T          |
| ATT-3B20         | DEC-2050T          |
| ATT-7300         | DEC-2060           |
| BBN-C/60         | DEC-2060T          |
| BURROUGHS-B/29   | DEC-2065           |
| BURROUGHS-B/4800 | DEC-FALCON         |
| BUTTERFLY        | DEC-KS10           |
| C/30             | DEC-VAX-11730      |
| C/70             | DORADO             |
| CADLINC          | DPS8/70M           |
| CADR             | ELXSI-6400         |
| CDC-170          | EVEREX-386         |
| CDC-170/750      | FOONLY-F2          |
| CDC-173          | FOONLY-F3          |
| CELERITY-1200    | FOONLY-F4          |
| CLUB-386         | GOULD              |
| COMPAQ-386/20    | GOULD-6050         |
| COMTEN-3690      | GOULD-6080         |
| CP8040           | GOULD-9050         |
| CRAY-1           | GOULD-9080         |
| CRAY-X/MP        | H-316              |
| CRAY-2           | H-60/68            |
| CTIWS-117        | H-68               |
| DANDELION        | H-68/80            |
| DEC-10           | H-89               |
| DEC-1050         | HONEYWELL-DPS-6    |
| DEC-1077         | HONEYWELL-DPS-8/70 |
| DEC-1080         | HP3000             |

|                                |                       |
|--------------------------------|-----------------------|
| HP3000/64                      | PDP-11                |
| IBM-158                        | PDP-11/3              |
| IBM-360/67                     | PDP-11/23             |
| IBM-370/3033                   | PDP-11/24             |
| IBM-3081                       | PDP-11/34             |
| IBM-3084QX                     | PDP-11/40             |
| IBM-3101                       | PDP-11/44             |
| IBM-4331                       | PDP-11/45             |
| IBM-4341                       | PDP-11/50             |
| IBM-4361                       | PDP-11/70             |
| IBM-4381                       | PDP-11/73             |
| IBM-4956                       | PE-7/32               |
| IBM-6152                       | PE-3205               |
| IBM-PC                         | PERQ                  |
| IBM-PC/AT                      | PLEXUS-P/60           |
| IBM-PC/RT                      | PLI                   |
| IBM-PC/XT                      | PLURIBUS              |
| IBM-SERIES/1                   | PRIME-2350            |
| IMAGEN                         | PRIME-2450            |
| IMAGEN-8/300                   | PRIME-2755            |
| IMSAI                          | PRIME-9655            |
| INTEGRATED-SOLUTIONS           | PRIME-9755            |
| INTEGRATED-SOLUTIONS-68K       | PRIME-9955II          |
| INTEGRATED-SOLUTIONS-CREATOR   | PRIME-2250            |
| INTEGRATED-SOLUTIONS-CREATOR-8 | PRIME-2655            |
| INTEL-386                      | PRIME-9955            |
| INTEL-IPSC                     | PRIME-9950            |
| IS-1                           | PRIME-9650            |
| IS-68010                       | PRIME-9750            |
| LMI                            | PRIME-2250            |
| LSI-11                         | PRIME-750             |
| LSI-11/2                       | PRIME-850             |
| LSI-11/23                      | PRIME-550II           |
| LSI-11/73                      | PYRAMID-90            |
| M68000                         | PYRAMID-90MX          |
| MAC-II                         | PYRAMID-90X           |
| MASSCOMP                       | RIDGE                 |
| MC500                          | RIDGE-32              |
| MC68000                        | RIDGE-32C             |
| MICROPORT                      | ROLM-1666             |
| MICROVAX                       | S1-MKIIA              |
| MICROVAX-I                     | SMI                   |
| MV/8000                        | SEQUENT-BALANCE-8000  |
| NAS3-5                         | SIEMENS               |
| NCR-COMTEN-3690                | SILICON-GRAPHICS      |
| NEXT/N1000-316                 | SILICON-GRAPHICS-IRIS |
| NOW                            | SGI-IRIS-2400         |
| ONYX-Z8000                     | SGI-IRIS-2500         |

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

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

## SYSTEM NAMES

These are the Official System Names as they appear in the Domain Name System WKS records and the NIC Host Table. Their use is described in RFC-952 [53].

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

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

## PROTOCOL AND SERVICE NAMES

These are the Official Protocol Names as they appear in the Domain Name System WKS records and the NIC Host Table. Their use is described in RFC-952 [53].

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

|             |  |
|-------------|--|
| ARGUS       | - ARGUS Protocol                                     |
| ARP         | - Address Resolution Protocol                        |
| AUTH        | - Authentication Service                             |
| BBN-RCC-MON | - BBN RCC Monitoring                                 |
| BL-IDM      | - Britton Lee Intelligent Database Machine           |
| BOOTP       | - Bootstrap Protocol                                 |
| BOOTPC      | - Bootstrap Protocol Client                          |
| BOOTPS      | - Bootstrap Protocol Server                          |
| BR-SAT-MON  | - Backroom SATNET Monitoring                         |
| CFTP        | - CFTP   |
| CHAOS       | - CHAOS Protocol                                     |
| CHARGEN     | - Character Generator Protocol                       |
| CISCO-FNA   | - CISCO FNATIVE                                      |
| CISCO-TNA   | - CISCO TNATIVE                                      |
| CISCO-SYS   | - CISCO SYSMANT                                      |
| CLOCK       | - DCNET Time Server Protocol                         |
| CMOT        | - Common Mgmt Info Services and Protocol 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                                   |
| DOMAIN      | - Domain Name System                                 |
| ECHO        | - Echo Protocol                                      |
| EGP         | - Exterior Gateway Protocol                          |
| EMCON       | - Emission Control Protocol                          |
| EMFIS-CNTL  | - EMFIS Control Service                              |
| EMFIS-DATA  | - EMFIS Data Service                                 |
| FINGER      | - Finger Protocol                                    |
| FTP         | - File Transfer Protocol                             |
| FTP-DATA    | - File Transfer Protocol Data                        |
| GGP         | - Gateway Gateway Protocol                           |
| GRAPHICS    | - Graphics Protocol                                  |
| HMP         | - Host Monitoring Protocol                           |
| HOST2-NS    | - Host2 Name Server                                  |
| HOSTNAME    | - Hostname Protocol                                  |

|            |   |
|------------|---|
| ICMP       | - Internet Control Message Protocol                 |
| IGMP       | - Internet Group Management Protocol                |
| IGP        | - Interior Gateway Protocol                         |
| IMAP2      | - Interim Mail Access Protocol version 2            |
| INGRES-NET | - INGRES-NET Service                                |
| IP         | - Internet Protocol                                 |
| IPCU       | - Internet Packet Core Utility                      |
| IPPC       | - Internet Pluribus Packet Core                     |
| IP-ARC     | - Internet Protocol on ARCNET                       |
| IP-ARPA    | - Internet Protocol on ARPANET                      |
| IP-DC      | - Internet Protocol on DC Networks                  |
| IP-DVMRP   | - Distance Vector Multicast Routing Protocol        |
| IP-E       | - Internet Protocol on Ethernet Networks            |
| IP-EE      | - Internet Protocol on Exp. Ethernet Nets           |
| IP-FDDI    | - Transmission of IP over FDDI                      |
| IP-HC      | - Internet Protocol on Hyperchannel                 |
| IP-IEEE    | - Internet Protocol on IEEE 802                     |
| IP-IPX     | - Transmission of 802.2 over IPX Networks           |
| IP-MTU     | - IP MTU Discovery Options                          |
| IP-NETBIOS | - Internet Protocol Datagrams over NetBIOS Networks |
| IP-SLIP    | - Transmission of IP over Serial Lines              |
| IP-WB      | - Internet Protocol on Wideband Network             |
| IP-X25     | - Internet Protocol on X.25 Networks                |
| IRTP       | - Internet Reliable Transaction Protocol            |
| ISI-GL     | - ISI Graphics Language Protocol                    |
| ISO-TP4    | - ISO Transport Protocol Class 4                    |
| ISO-TSAP   | - ISO TSAP  |
| LA-MAINT   | - IMP Logical Address Maintenance                   |
| LARP       | - Locus Address Resolution Protocol                 |
| LDP        | - Loader Debugger Protocol                          |
| LEAF-1     | - Leaf-1 Protocol                                   |
| LEAF-2     | - Leaf-2 Protocol                                   |
| LINK       | - Link Protocol                                     |
| LOC-SRV    | - Location Service                                  |
| LOGIN      | - Login Host Protocol                               |
| MAIL       | - Format of Electronic Mail Messages                |
| MERIT-INP  | - MERIT Internodal Protocol                         |
| METAGRAM   | - Metagram Relay                                    |
| MIB        | - Management Information Base                       |
| MIT-ML-DEV | - MIT ML Device                                     |
| MFE-NSP    | - MFE Network Services Protocol                     |
| MIT-SUBNET | - MIT Subnet Support                                |
| MIT-DOV    | - MIT Dover Spooler                                 |
| MPM        | - Internet Message Protocol (Multimedia Mail)       |
| MPM-FLAGS  | - MPM Flags Protocol                                |
| MPM-SND    | - MPM Send Protocol                                 |
| MSG-AUTH   | - MSG Authentication Protocol                       |
| MSG-ICP    | - MSG ICP Protocol                                  |

|             |   |
|-------------|---|
| MUX         | - Multiplexing Protocol                         |
| NAMESERVER  | - Host Name Server                              |
| NETBIOS-DGM | - NETBIOS Datagram Service                      |
| NETBIOS-NS  | - NETBIOS Name Service                          |
| NETBIOS-SSN | - NETBIOS Session Service                       |
| NETBLT      | - Bulk Data Transfer Protocol                   |
| NETED       | - Network Standard Text Editor                  |
| NETRJS      | - Remote Job Service                            |
| NI-FTP      | - NI File Transfer Protocol                     |
| NI-MAIL     | - NI Mail Protocol                              |
| NICNAME     | - Who Is Protocol                               |
| NFILE       | - A File Access Protocol                        |
| NNTP        | - Network News Transfer Protocol                |
| NSW-FE      | - NSW User System Front End                     |
| NTP         | - Network Time Protocol                         |
| NVP-II      | - Network Voice Protocol                        |
| OSPF        | - Open Shortest Path First Interior GW Protocol |
| PCMAIL      | - Pcmail Transport Protocol                     |
| POP2        | - Post Office Protocol - Version 2              |
| POP3        | - Post Office Protocol - Version 3              |
| PPP         | - Point-to-Point Protocol                       |
| PRM         | - Packet Radio Measurement                      |
| PUP         | - PUP Protocol                                  |
| PWDGEN      | - Password Generator Protocol                   |
| QUOTE       | - Quote of the Day Protocol                     |
| RARP        | - A Reverse Address Resolution Protocol         |
| RATP        | - Reliable Asynchronous Transfer Protocol       |
| 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           |
| TELNET    | - Telnet Protocol                         |
| TFTP      | - Trivial File Transfer Protocol          |
| THINWIRE  | - Thinwire Protocol                       |
| TIME      | - Time Server Protocol                    |
| TP-TCP    | - ISO Transport Service on top of the TCP |
| TRUNK-1   | - Trunk-1 Protocol                        |
| TRUNK-2   | - Trunk-2 Protocol                        |
| UCL       | - University College London Protocol      |
| UDP       | - User Datagram Protocol                  |
| NNTP      | - Network News Transfer Protocol          |
| USERS     | - Active Users Protocol                   |
| UUCP-PATH | - UUCP Path Service                       |
| VIA-FTP   | - VIA Systems-File Transfer Protocol      |
| VISA      | - VISA Protocol                           |
| VMTP      | - Versatile Message Transaction Protocol  |
| WB-EXPAK  | - Wideband EXPAK                          |
| WB-MON    | - Wideband Monitoring                     |
| XNET      | - Cross Net Debugger                      |
| XNS-IDP   | - Xerox NS IDP                            |

## TERMINAL TYPE NAMES

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

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

|                       |                  |
|-----------------------|------------------|
| ADDS-CONSUL-980       | DATAMEDIA-1521   |
| ADDS-REGENT-100       | DATAMEDIA-2500   |
| ADDS-REGENT-20        | DATAMEDIA-3025   |
| ADDS-REGENT-200       | DATAMEDIA-3025A  |
| ADDS-REGENT-25        | DATAMEDIA-3045   |
| ADDS-REGENT-40        | DATAMEDIA-3045A  |
| ADDS-REGENT-60        | DATAMEDIA-DT80/1 |
| ADDS-VIEWPOINT        | DATAPOINT-2200   |
| ADDS-VIEWPOINT-60     | DATAPOINT-3000   |
| AED-512               | DATAPOINT-3300   |
| AMPEX-DIALOGUE-210    | DATAPOINT-3360   |
| AMPEX-DIALOGUE-80     | DEC-DECWRITER-I  |
| AMPEX-210             | DEC-DECWRITER-II |
| AMPEX-230             | DEC-GIGI         |
| ANDERSON-JACOBSON-510 | DEC-GT40         |
| ANDERSON-JACOBSON-630 | DEC-GT40A        |
| ANDERSON-JACOBSON-832 | DEC-GT42         |
| ANDERSON-JACOBSON-841 | DEC-LA120        |
| ANN-ARBOR-AMBASSADOR  | DEC-LA30         |
| ANSI                  | DEC-LA36         |
| ARDS                  | DEC-LA38         |
| BITGRAPH              | DEC-VT05         |
| BUSSIPLEXER           | DEC-VT100        |
| CALCOMP-565           | DEC-VT101        |
| CDC-456               | DEC-VT102        |
| CDI-1030              | DEC-VT125        |
| CDI-1203              | DEC-VT131        |
| C-ITOH-101            | DEC-VT132        |
| C-ITOH-50             | DEC-VT200        |
| C-ITOH-80             | DEC-VT220        |
| CLNZ                  | DEC-VT240        |
| COMPUCOLOR-II         | DEC-VT241        |
| CONCEPT-100           | DEC-VT300        |
| CONCEPT-104           | DEC-VT320        |
| CONCEPT-108           | DEC-VT340        |
| DATA-100              | DEC-VT50         |
| DATA-GENERAL-6053     | DEC-VT50H        |
| DATAGRAPHIX-132A      | DEC-VT52         |
| DATAMEDIA-1520        | DEC-VT55         |

|                       |              |
|-----------------------|--------------|
| DEC-VT61              | HP-2649A     |
| DEC-VT62              | IBM-1050     |
| DELTA-DATA-5000       | IBM-2741     |
| DELTA-DATA-NIH-7000   | IBM-3101     |
| DELTA-TELTERM-2       | IBM-3101-10  |
| DIABLO-1620           | IBM-3151     |
| DIABLO-1640           | IBM-3275-2   |
| DIGILOG-333           | IBM-3276-2   |
| DTC-300S              | IBM-3276-3   |
| DTC-382               | IBM-3276-4   |
| EDT-1200              | IBM-3277-2   |
| EXECUPORT-4000        | IBM-3278-2   |
| EXECUPORT-4080        | IBM-3278-3   |
| FACIT-TWIST-4440      | IBM-3278-4   |
| FREEDOM-100           | IBM-3278-5   |
| FREEDOM-110           | IBM-3279-2   |
| FREEDOM-200           | IBM-3279-3   |
| GENERAL-TERMINAL-100A | IBM-5151     |
| GENERAL-TERMINAL-101  | IBM-5154     |
| GIPSI-TX-M            | IBM-5081     |
| GIPSI-TX-ME           | IBM-6153     |
| GIPSI-TX-C4           | IBM-6154     |
| GIPSI-TX-C8           | IBM-6155     |
| GSI                   | IBM-AED      |
| HAZELTINE-1420        | IBM-3278-2-E |
| HAZELTINE-1500        | IBM-3278-3-E |
| HAZELTINE-1510        | IBM-3278-4-E |
| HAZELTINE-1520        | IBM-3278-5-E |
| HAZELTINE-1552        | IBM-3279-2-E |
| HAZELTINE-2000        | IBM-3279-3-E |
| HAZELTINE-ESPRIT      | IMLAC        |
| HP-2392               | INFOTON-100  |
| HP-2621               | INFOTON-400  |
| HP-2621A              | INFOTONKAS   |
| HP-2621P              | ISC-8001     |
| HP-2623               | LSI-ADM-1    |
| HP-2626               | LSI-ADM-11   |
| HP-2626A              | LSI-ADM-12   |
| HP-2626P              | LSI-ADM-2    |
| HP-2627               | LSI-ADM-20   |
| HP-2640               | LSI-ADM-22   |
| HP-2640A              | LSI-ADM-220  |
| HP-2640B              | LSI-ADM-3    |
| HP-2645               | LSI-ADM-31   |
| HP-2645A              | LSI-ADM-3A   |
| HP-2648               | LSI-ADM-42   |
| HP-2648A              | LSI-ADM-5    |
| HP-2649               | MEMOREX-1240 |

|                                   |                    |
|-----------------------------------|--------------------|
| MICROBEE                          | TELETEC-DATASCREEN |
| MICROTERM-ACT-IV                  | TELETERM-1030      |
| MICROTERM-ACT-V                   | TELETYPE-33        |
| MICROTERM-ERGO-301                | TELETYPE-35        |
| MICROTERM-MIME-1                  | TELETYPE-37        |
| MICROTERM-MIME-2                  | TELETYPE-38        |
| MICROTERM-ACT-5A                  | TELETYPE-40        |
| MICROTERM-TWIST                   | TELETYPE-43        |
| NEC-5520                          | TELEVIDEO-910      |
| NETRONICS                         | TELEVIDEO-912      |
| NETWORK-VIRTUAL-TERMINAL          | TELEVIDEO-920      |
| OMRON-8025AG                      | TELEVIDEO-920B     |
| PERKIN-ELMER-550                  | TELEVIDEO-920C     |
| PERKIN-ELMER-1100                 | TELEVIDEO-925      |
| PERKIN-ELMER-1200                 | TELEVIDEO-955      |
| PERQ                              | TELEVIDEO-950      |
| PLASMA-PANEL                      | TELEVIDEO-970      |
| QUME-SPRINT-5                     | TELEVIDEO-975      |
| QUME-101                          | TERMINET-1200      |
| QUME-102                          | TERMINET-300       |
| SOROC                             | TI-700             |
| SOROC-120                         | TI-733             |
| SOUTHWEST-TECHNICAL-PRODUCTS-CT82 | TI-735             |
| SUN                               | TI-743             |
| SUPERBEE                          | TI-745             |
| SUPERBEE-III-M                    | TI-800             |
| TEC                               | TYCOM              |
| TEKTRONIX-4006                    | UNIVAC-DCT-500     |
| TEKTRONIX-4010                    | VIDEO-SYSTEMS-1200 |
| TEKTRONIX-4012                    | VIDEO-SYSTEMS-5000 |
| TEKTRONIX-4013                    | VOLKER-CRAIG-303   |
| TEKTRONIX-4014                    | VOLKER-CRAIG-303A  |
| TEKTRONIX-4023                    | VOLKER-CRAIG-404   |
| TEKTRONIX-4024                    | VISUAL-200         |
| TEKTRONIX-4025                    | VISUAL-55          |
| TEKTRONIX-4027                    | WYSE-30            |
| TEKTRONIX-4105                    | WYSE-50            |
| TEKTRONIX-4107                    | WYSE-60            |
| TEKTRONIX-4110                    | WYSE-75            |
| TEKTRONIX-4112                    | WYSE-85            |
| TEKTRONIX-4113                    | XEROX-1720         |
| TEKTRONIX-4114                    | XTERM              |
| TEKTRONIX-4115                    | ZENITH-H19         |
| TEKTRONIX-4125                    | ZENITH-Z29         |
| TEKTRONIX-4404                    | ZENTEC-30          |
| TELERAY-1061                      |                    |
| TELERAY-3700                      |                    |
| TELERAY-3800                      |                    |

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#### Security Considerations

Security issues are not discussed in this memo.

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