## *APPENDIX B : IP Aliases of KCODE*

### Ethernet Aliases

```
ETHER_MACADDRDST                [      0,       5]
ETHER_MACADDRSRC                [      6,      11]
ETHER_TYPE                      [     12,      13]
ETHER_HEADER                    [      0,      13]
ETHER_DATA                      [     14,       ]

CNST_MACADDR_BROADCAST           {0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF}
CNST_ETHER_TYPE_ARP             {0x08, 0x06}
CNST_ETHER_TYPE_IP              {0x08, 0x00}
```

### ARP Aliases

```
ETHER_ARP_HARDTYPE              [     14,      15]
ETHER_ARP_PROTTYPE              [     16,      17]
ETHER_ARP_HARDSIZE              [     18,      18]
ETHER_ARP_PROTSIZE              [     19,      19]
ETHER_ARP_OP                    [     20,      21]
ETHER_ARP_MACADDRSNDR           [     22,      27]
ETHER_ARP_IPADDRSNDR            [     28,      31]
ETHER_ARP_MACADDRTRGT           [     32,      37]
ETHER_ARP_IPADDRTRGT            [     38,      41]

CNST_ETHER_ARP_HARDTYPE_ETHER    {0x00, 0x01}
CNST_ETHER_ARP_PROTTYPE_IP      {0x08, 0x00}
CNST_ETHER_ARP_HARDSIZE_ETHER    6
CNST_ETHER_ARP_PROTSIZE_IP      4
CNST_ETHER_ARP_OP_ARPREQ        {0, 1}
CNST_ETHER_ARP_OP_ARPREPLY      {0, 2}
```

### IP Aliases relative to the data portion of an Ethernet frame

```
IP_VERHEADERLEN                 [      0        ]
IP_TOS                          [      1        ]
IP_LEN                          [      2,       3]
IP_ID                           [      4,       5]
IP_FLAGSOFF                     [      6,       7]
IP_TTL                          [      8        ]
IP_PROT                         [      9        ]
IP_HEADERCHKSUM                 [     10,      11]
IP_ADDRSRC                      [     12,      15]
IP_ADDRDST                      [     16,      19]
IP_OPTION                       [     20,       ]
IP_HEADER                       [      0,      (IP_VERHEADERLEN & 0X0F) * 4 - 1]
IP_DATA                         [(IP_VERHEADERLEN & 0X0F) * 4, ]

CNST_IP_ADDR_BROADCAST           {0xFF, 0xFF, 0xFF, 0xFF}

CNST_IP_PROT_ICMP                1
CNST_IP_PROT_IGMP                2
CNST_IP_PROT_UDP                 17
CNST_IP_PROT_TCP                 6
CNST_IP_PROT_KDP                 200
CNST_IP_PROT_UFC                 201
```

| | |
|---|---|
| CNST_IP_TOS_NORMAL | 0x00 |
| CNST_IP_TOS_MINCOST | 0x02 |
| CNST_IP_TOS_MAXRELIABLITY | 0x04 |
| CNST_IP_TOS_MAXTHROUGHPUT | 0x08 |
| CNST_IP_TOS_MINDELAY | 0x10 |
| | |
| CNST_IP_DF | 0X40 |
| CNST_IP_MF | 0X20 |

**ICMP Aliases relative to the data portion of an IP datagram**

| | |
|---|---|
| ICMP_TYPE | [ 0 ] |
| ICMP_CODE | [ 1 ] |
| ICMP_TYPE_CODE | [ 0, 1] |
| ICMP_CHKSUM | [ 2, 3] |
| ICMP_ECHO_ID | [ 4, 5] |
| ICMP_ECHO_SEQNUM | [ 6, 7] |
| | |
| CNST_ICMP_TYPE_CODE_ECHOREQ | { 8, 0} |
| CNST_ICMP_TYPE_CODE_ECHOREPLY | { 0, 0} |

**UDP Aliases relative to the data portion of an IP datagram**

| | |
|---|---|
| UDP_PSEUDO_IP_ADDRSRC | [ 0, 3] |
| UDP_PSEUDO_IP_ADDRDST | [ 4, 7] |
| UDP_PSEUDO_ZERO | [ 8 ] |
| UDP_PSEUDO_PROT | [ 9 ] |
| UDP_PSEUDO_LEN | [ 10, 11] |
| UDP_PSEUDO_HEADER | [ 0, 11] |
| UDP_PSEUDO_DATA | [ 12, ] |
| | |
| UDP_PORTSRC | [ 0, 1] |
| UDP_PORTDST | [ 2, 3] |
| UDP_LEN | [ 4, 5] |
| UDP_CHKSUM | [ 6, 7] |
| UDP_HEADER | [ 0, 7] |
| UDP_DATA | [ 8, ] |

**KDP Aliases relative to the data portion of an IP datagram for Exercises 11, 12, and 13**

| | |
|---|---|
| KDP_ID | [ 0, 1] |
| KDP_ACK | [ 2 ] |
| KDP_WINDOW_SIZE | [ 3 ] |
| KDP_HEADER | [ 0, 3] |
| KDP_DATA | [ 4, ] |
| | |
| SND_UNA | [ 4, 5] |
| SND_NXT | [ 6, 7] |
| SND_WND | [ 8, 9] |
| SND_CWND | [ 10, 11] |
| SND_SSTHRESH | [ 12, 13] |
| | |
| RCV_NXT | [ 14, 15] |
| RCV_WND | [ 16, 17] |

**TCP Aliases relative to the data portion of an IP datagram**

| | |
|---|---|
| TCP_PSEUDO_IP_ADDRSRC | [ 0, 3] |
| TCP_PSEUDO_IP_ADDRDST | [ 4, 7] |
| TCP_PSEUDO_ZERO | [ 8 ] |

TCP_PSEUDO_PROT [ 9 ]
TCP_PSEUDO_LEN [ 10, 11]
TCP_PSEUDO_HEADER [ 0, 11]
TCP_PSEUDO_DATA [ 12, ]

TCP_PORTSRC [ 0, 1]
TCP_PORTDST [ 2, 3]
TCP_SEQ_NUM [ 4, 7]
TCP_ACK_NUM [ 8, 11]
TCP_DATA_OFFSET [ 12 ]
TCP_FLAGS [ 13 ]
TCP_WINDOW [ 14, 15]
TCP_CHKSUM [ 16, 17]
TCP_URG_PTR [ 18, 19]
TCP_OPTION [ 20, ]
TCP_HEADER [ 0, TCP_DATA_OFFSET / 4 - 1]
TCP_DATA [TCP_DATA_OFFSET / 4, ]

**TCP Control Block**

TCB_SOCKET_ID [ 0, 3]
TCB_IP_ADDRSRC [ 4, 7]
TCB_IP_ADDRDST [ 8, 11]
TCB_PORTSRC [ 12, 13]
TCB_PORTDST [ 14, 15]

TCB_STATE [ 16, 17]
TCB_RXTSHIFT [ 18, 19]
TCB_RXTCUR [ 20, 21]
TCB_DUPACKS [ 22, 23]
TCB_MAXSEG [ 24, 25]
TCB_FORCE [ 26, 27]
TCB_FLAGS [ 28, 29]

TCB_TIMER_SYN [ 30, 31]
TCB_TIMER_REXMT [ 32, 33]
TCB_TIMER_PERSIST [ 34, 35]
TCB_TIMER_KEEP [ 36, 37]
TCB_TIEMR_FINWAIT2 [ 38, 39]
TCB_TIMER_2MSL [ 40, 41]
TCB_TIMER_DELACK [ 42, 43]

TCB_SND_UNA [ 44, 47]
TCB_SND_NXT [ 48, 51]
TCB_SND_MAX [ 52, 55]
TCB_SND_WND [ 56, 59]
TCB_SND_CWND [ 60, 63]
TCB_SND_SSTHRESH [ 64, 67]
TCB_SND_UP [ 68, 71]
TCB_SND_WL1 [ 72, 75]
TCB_SND_WL2 [ 76, 79]
TCB_ISS [ 80, 83]

TCB_RCV_NXT [ 84, 87]
TCB_RCV_WND [ 88, 91]
TCB_RCV_ADV [ 92, 95]
TCB_RCV_UP [ 96, 99]
TCB_IRS [ 100, 103]

TCB_IDLE [ 104, 105]

```
TCB_RTT                                 [     106,      107]
TCB_RTSEG                               [     108,      111]
TCB_SRTT                                [     112,      113]
TCB_RTTVAR                              [     114,      115]
TCB_RTTMIN                              [     116,      117]
TCB_MAX_SNDWND                          [     120,      123]

TCB_POOL_REASSEMBLY                     [     124,      127]
TCB_POOL_RETRANSMISSION                 [     128,      131]
TCB_WAS_LISTENING                       [     132,      133]

TCB_SND_BUF_SEM                         [     136,      139]
TCB_SND_BUF_SIZE                        [     140,      143]
TCB_SND_BUF_L                           [     144,      145]
TCB_SND_BUF_H                           [     146,      147]

TCB_RCV_BUF_SEM                         [     148,      151]
TCB_RCV_BUF_SIZE                        [     152,      155]
TCB_RCV_BUF_L                           [     156,      157]
TCB_RCV_BUF_H                           [     158,      159]

TCB_SND_BUF                             [     160                    ,          ]
TCB_RCV_BUF                             [     160 + TCB_SND_BUF_SIZE   ,          ]

TCB                     [       0, 160 + TCB_SND_BUF_SIZE + TCB_RCV_BUF_SIZE - 1]

CNST_TCP_FLAG_FIN                       0X01
CNST_TCP_FLAG_SYN                       0X02
CNST_TCP_FLAG_RST                       0X04
CNST_TCP_FLAG_PSH                       0X08
CNST_TCP_FLAG_ACK                       0X10
CNST_TCP_FLAG_URG                       0X20
CNST_TCP_FLAG_ECE                       0X40
CNST_TCP_FLAG_CWR                       0X80

CNST_TCB_STATE_CLOSED                   0
CNST_TCB_STATE_LISTEN                   1
CNST_TCB_STATE_SYN_SENT                 2
CNST_TCB_STATE_SYN_RECEIVED             3
CNST_TCB_STATE_ESTABLISHED              4 // states CNST_TCB_STATE_ESTABLISHED
are those where connections not established.
CNST_TCB_STATE_CLOSE_WAIT               5 // states CNST_TCB_STATE_CLOSE_WAIT
are those where user has closed.
CNST_TCB_STATE_FIN_WAIT_1               6
CNST_TCB_STATE_CLOSING                  7
CNST_TCB_STATE_LAST_ACK                 8
CNST_TCB_STATE_FIN_WAIT_2               9 // states CNST_TCB_STATE_CLOSE_WAIT
&& CNST_TCB_STATE_FIN_WAIT_2 await ACK of FIN.
CNST_TCB_STATE_TIME_WAIT                10

CNST_TF_ACKNOW                          0X01
CNST_TF_DELACK                          0X02
CNST_TF_NODELAY                         0X04
CNST_TF_NOOPT                           0X08
CNST_TF_SENTFIN                         0X10

CNST_TCP_NO_ERROR                                       0XFFFFFFFFW
CNST_TCP_ERROR_OPEN                                             1W
CNST_TCP_ERROR_LISTEN                                           2W
CNST_TCP_ERROR_CLOSE                                            3W
```

CNST_TCP_ERROR_SEND 4W
CNST_TCP_ERROR_RECEIVE 5W

**UFC Aliases relative to the data portion of an IP datagram**

UFC_PSEUDO_IP_ADDRSRC [ 0, 3]
UFC_PSEUDO_IP_ADDRDST [ 4, 7]
UFC_PSEUDO_ZERO [ 8 ]
UFC_PSEUDO_PROT [ 9 ]
UFC_PSEUDO_LEN [ 10, 11]
UFC_PSEUDO_HEADER [ 0, 11]
UFC_PSEUDO_DATA [ 12, ]

UFC_PORTSRC [ 0, 1]
UFC_PORTDST [ 2, 3]
UFC_LEN [ 4, 5]
UFC_CHKSUM [ 6, 7]
UFC_HEADER [ 0, 7]
UFC_DATA [ 8, ]

**UFC Control Block**

UCB_SOCKET_ID [ 0, 3]
UCB_IP_ADDRSRC [ 4, 7]
UCB_IP_ADDRDST [ 8, 11]
UCB_PORTSRC [ 12, 13]
UCB_PORTDST [ 14, 15]

UCB_STATE [ 16, 17]

CNST_UFC_STATE_CLOSED 0
CNST_UFC_STATE_LISTEN 1
CNST_UFC_STATE_ESTABLISHED 2

CNST_UFC_NO_ERROR 0XFFFFFFFFW
CNST_UFC_ERROR_OPEN 1W
CNST_UFC_ERROR_LISTEN 2W
CNST_UFC_ERROR_CLOSE 3W
CNST_UFC_ERROR_SEND 4W
CNST_UFC_ERROR_RECEIVE 5W