

---

# Index

---

## Symbols

::, 160  
::1, 160  
0.0.0.0, 146, 155  
100BaseTX, 234  
10Base2, 233  
10Base5, 233  
10BaseT, 233  
127.0.0.1, 146  
255.255.255.255, 155  
802.11 frame format, 242  
802.5 data frame, 227  
802.5 token frame, 227

## A

abrupt connection release, 18, 86  
Additive Increase Multiplicative Decrease (AIMD), 109  
address, 11  
address learning, 235  
Address Resolution Protocol, 154  
ad hoc network, 242  
AF\_INET, 56  
AF\_INET6, 56  
AF\_UNSPEC, 56  
AIMD, 249  
ALG, 169  
ALOHA, 216  
Alternating Bit Protocol, 72  
anycast, 249  
API, 249  
Application layer, 23  
Application Level Gateway, 169  
ARP, 154, 249  
ARP cache, 154  
ARPANET, 249  
ascii, 249  
ASN.1, 249  
ATM, 249

## B

Base64 encoding, 41  
Basic Service Set (BSS), 242

beacon frame (802.11), 245  
BGP, 178, 249  
BGP Adj-RIB-In, 181  
BGP Adj-RIB-Out, 181  
BGP decision process, 187  
BGP KEEPALIVE, 180  
BGP local-preference, 187  
BGP nexthop, 183  
BGP NOTIFICATION, 180  
BGP OPEN, 180  
BGP peer, 179  
BGP RIB, 181  
BGP UPDATE, 180  
binary exponential back-off (CSMA/CD), 221  
bit stuffing, 212  
BNF, 249  
Border Gateway Protocol, 178  
bridge, 234  
broadcast, 249  
BSS, 242

## C

Carrier Sense Multiple Access, 217  
Carrier Sense Multiple Access with Collision Avoid-  
ance, 222  
Carrier Sense Multiple Access with Collision Detec-  
tion, 218  
character stuffing, 213  
Checksum computation, 88  
CIDR, 249  
Class A IPv4 address, 142  
Class B IPv4 address, 142  
Class C IPv4 address, 142  
Classless Interdomain Routing, 144  
Clear To Send, 225  
Cold potato routing, 191  
collision, 215  
collision detection, 219  
collision domain, 233  
confirmed connectionless service, 13  
congestion collapse, 107  
connection establishment, 16

connection-oriented service, 16  
Connectionless service, 12  
connectionless service, 13  
count to infinity, 135  
CSMA, 217  
CSMA (non-persistent), 218  
CSMA (persistent), 217  
CSMA/CA, 222  
CSMA/CD, 218  
CTS, 225  
CTS frame (802.11), 244  
cumulative acknowledgements, 76  
customer-provider peering relationship, 177

## D

datagram, 129  
Datalink layer, 22  
delayed acknowledgements, 102  
Denial of Service, 93  
DHCP, 155  
DHCPv6, 166  
dial-up line, 249  
DIFS, 222  
Distance vector, 133  
**Distributed Coordination Function Inter Frame Space,**  
222  
DNS, 249  
DNS message format, 34  
Dynamic Host Configuration Protocol, 155

## E

EAP, 229  
eBGP, 185, 250  
EGP, 250  
EIFS, 222  
EIGRP, 250  
electrical cable, 20  
email message format, 38  
Ending Delimiter (Token Ring), 227  
Ethernet bridge, 234  
Ethernet DIX frame format, 231  
Ethernet hub, 233  
Ethernet switch, 234  
Ethernet Type field, 230  
EtherType, 230  
exponential backoff, 102  
export policy, 178  
Extended Inter Frame Space, 222  
Extensible Authentication Protocol, 229

## F

Fairness, 107  
Fast Ethernet, 234  
FDM, 215  
firewall, 166  
Five layers reference model, 20  
frame, 22, 250  
Frame-Relay, 250

framing, 212  
Frequency Division Multiplexing, 215  
FTP, 250  
ftp, 250

## G

getaddrinfo, 56  
go-back-n, 75  
graceful connection release, 19, 86

## H

Hello message, 137  
hidden station problem, 225  
hop-by-hop forwarding, 129  
hosts.txt, 32, 250  
Hot potato routing, 190  
HTML, 250  
HTTP, 250  
hub, 250

## I

IANA, 250  
iBGP, 185, 250  
ICANN, 250  
ICMP, 150  
IETF, 250  
IGP, 250  
IGRP, 250  
IMAP, 250  
import policy, 178  
independent network, 242  
infrastructure network, 242  
interdomain routing policy, 178  
Internet, 250  
internet, 250  
Internet Control Message Protocol, 150  
inverse query, 250  
IP, 250  
IP options, 150  
IP prefix, 142  
IP subnet, 142  
IPv4, 250  
IPv4 fragmentation and reassembly, 149  
IPv6, 251  
IPv6 fragmentation, 163  
IS-IS, 251  
ISN, 251  
ISO, 251  
ISO-3166, 251  
ISP, 251  
ITU, 251  
IXP, 251

## J

jamming, 219  
jumbogram, 162

**L**

label, 131  
 LAN, 251  
 large window, 99  
 leased line, 251  
 Link Local address, 160  
 link local IPv4 addresses, 146  
 link-state routing, 137  
 LLC, 232  
 Logical Link Control (LLC), 232  
 loopback interface, 185

**M**

MAC address learning, 235  
 MAC address table (Ethernet switch), 235  
 MAN, 251  
 man-in-the-middle attack, 155  
 Manchester encoding, 212  
 max-min fairness, 107  
 Maximum Segment Lifetime (MSL), 83  
 maximum segment lifetime (MSL), 79  
 Maximum Segment Size, 94  
 Maximum Transmission Unit, 148  
 Maximum Transmission Unit (MTU), 149  
 message-mode data transfer, 17  
 Middlebox, 166  
 MIME, 251  
 MIME document, 251  
 minicomputer, 251  
 modem, 251  
 Monitor station, 228  
 monomode optical fiber, 20  
 MSS, 94, 251  
 MTU, 148  
 Multi-Exit Discriminator (MED), 191  
 multicast, 251  
 multihomed host, 142  
 multihomed network, 145  
 multimode optical fiber, 20

**N**

Nagle algorithm, 98  
 nameserver, 251  
 NAT, 168, 251  
 NAT66, 169  
 NBMA, 128, 251  
 Neighbour Discovery Protocol, 166  
 Network Address Translation, 168  
 Network Information Center, 32  
 Network layer, 22  
 network-byte order, 251  
 NFS, 252  
 Non-Broadcast Multi-Access Networks, 128  
 non-persistent CSMA, 218  
 NTP, 252

**O**

Open Shortest Path First, 172

optical fiber, 20  
 ordering of SDUs, 13  
 Organisation Unique Identifier, 230  
 OSI, 252  
 OSI reference model, 23  
 OSPF, 172, 252  
 OSPF area, 172  
 OSPF Designated Router, 173  
 OUI, 230

**P**

packet, 22, 252  
 packet radio, 216  
 packet size distribution, 99  
 Path MTU discovery, 153  
 PBL, 252  
 peer-to-peer, 30  
 persistence timer, 79  
 persistent CSMA, 217  
 Physical layer, 22  
 piggybacking, 81  
 ping, 152  
 ping6, 165  
 Point-to-Point Protocol, 228  
 POP, 252  
 Post Office Protocol, 45  
 PPP, 228  
 private IPv4 addresses, 146  
 Provider Aggregatable address, 159  
 Provider Independent address, 159  
 provision of a byte stream service, 81

**R**

Reference models, 20  
 reliable connectionless service, 13  
 Request To Send, 225  
 resolver, 252  
 RFC  
   RFC 1032, 32, 264  
   RFC 1035, 33–35, 249, 264  
   RFC 1042, 245, 264  
   RFC 1055, 229, 265  
   RFC 1071, 88, 114, 265  
   RFC 1094, 252  
   RFC 1122, 23, 90, 91, 95, 103, 231, 265  
   RFC 1144, 229, 265  
   RFC 1149, 81, 265  
   RFC 1169, 5, 265  
   RFC 1191, 153, 265  
   RFC 1195, 172, 265  
   RFC 1258, 92, 265  
   RFC 1305, 252  
   RFC 1321, 114, 265  
   RFC 1323, 95, 99–101, 105, 265  
   RFC 1347, 158, 265  
   RFC 1350, 116  
   RFC 1518, 144, 249, 265  
   RFC 1519, 143, 145, 265

RFC 1542, 11, 265  
RFC 1548, 229, 265  
RFC 1550, 158, 265  
RFC 1561, 158, 265  
RFC 1621, 158, 265  
RFC 1624, 157, 265  
RFC 1631, 158, 265  
RFC 1661, 127, 154, 265  
RFC 1662, 229, 265  
RFC 1710, 158, 161, 265  
RFC 1738, 48, 54, 265  
RFC 1752, 157, 158, 265  
RFC 1812, 110, 143, 265  
RFC 1819, 158, 265  
RFC 1889, 265  
RFC 1896, 41, 265  
RFC 1918, 147, 160, 168, 183, 265  
RFC 1939, 45, 46, 64, 252, 266  
RFC 1945, 50, 51, 64, 266  
RFC 1948, 92, 266  
RFC 1951, 162, 266  
RFC 1981, 165, 266  
RFC 20, 28, 41, 264  
RFC 2001, 117  
RFC 2003, 187, 266  
RFC 2018, 104, 266  
RFC 2045, 40, 41, 251, 266  
RFC 2046, 40, 41, 266  
RFC 2050, 144, 266  
RFC 2080, 171, 172, 266  
RFC 2082, 171, 266  
RFC 2131, 156, 266  
RFC 2140, 97, 101, 266  
RFC 2225, 156, 266  
RFC 2328, 172, 175, 252, 266  
RFC 2332, 156, 266  
RFC 2364, 230, 266  
RFC 2368, 266  
RFC 2453, 171, 252, 266  
RFC 2460, 161–163, 266  
RFC 2464, 232, 266  
RFC 2507, 162, 266  
RFC 2516, 230, 266  
RFC 2581, 104, 266  
RFC 2616, 44, 50–53, 65, 250, 266  
RFC 2617, 54, 266  
RFC 2622, 178, 266  
RFC 2675, 162  
RFC 2711, 163  
RFC 2766, 169, 266  
RFC 2821, 43  
RFC 2854, 41, 266  
RFC 2920, 114  
RFC 2965, 266  
RFC 2988, 94, 100–102, 267  
RFC 2991, 267  
RFC 3021, 143, 267  
RFC 3022, 168, 267  
RFC 3031, 186, 267  
RFC 3168, 90, 110, 118, 267  
RFC 3187, 48  
RFC 3234, 166, 267  
RFC 3235, 169, 267  
RFC 3309, 71, 114, 267  
RFC 3315, 166, 267  
RFC 3330, 267  
RFC 3360, 95, 267  
RFC 3390, 112, 117, 267  
RFC 3490, 267  
RFC 3501, 45, 250, 267  
RFC 3513, 158, 267  
RFC 3596, 36, 267  
RFC 3748, 229, 267  
RFC 3782, 113, 125  
RFC 3819, 127, 267  
RFC 3828, 267  
RFC 3927, 147, 160, 267  
RFC 3931, 186, 267  
RFC 3971, 166, 267  
RFC 3972, 166, 267  
RFC 3986, 48, 54, 267  
RFC 4033, 35, 267  
RFC 4151, 48  
RFC 4193, 160, 268  
RFC 4251, 47, 268  
RFC 4253, 252  
RFC 4264, 192, 268  
RFC 4271, 178, 180, 268  
RFC 4287, 48  
RFC 4291, 160, 268  
RFC 4301, 164, 268  
RFC 4302, 164, 268  
RFC 4303, 164, 268  
RFC 4340, 268  
RFC 4443, 164, 165, 268  
RFC 4451, 191, 268  
RFC 4456, 185, 268  
RFC 4614, 89, 268  
RFC 4632, 249  
RFC 4634, 114  
RFC 4648, 41, 42, 268  
RFC 4822, 171, 268  
RFC 4838, 6, 268  
RFC 4861, 166, 268  
RFC 4862, 166, 268  
RFC 4870, 45, 268  
RFC 4871, 45, 268  
RFC 4941, 166, 268  
RFC 4944, 148, 162, 268  
RFC 4952, 41, 268  
RFC 4953, 95, 268  
RFC 4954, 43, 45, 268  
RFC 4963, 153, 157, 268  
RFC 4966, 169, 268  
RFC 4987, 94, 268  
RFC 5004, 191, 268

- RFC 5065, 185, 269
  - RFC 5068, 45, 269
  - RFC 5072, 229, 269
  - RFC 5095, 163, 269
  - RFC 5227, 155, 269
  - RFC 5234, 29, 249, 269
  - RFC 5246, 253
  - RFC 5321, 43, 44, 63, 269
  - RFC 5322, 38, 39, 43, 269
  - RFC 5340, 172, 252, 269
  - RFC 5531, 252
  - RFC 5598, 38, 269
  - RFC 5646, 65, 269
  - RFC 5681, 110, 111, 125, 269
  - RFC 5735, 146, 269
  - RFC 5795, 229, 269
  - RFC 5880, 262
  - RFC 5890, 33, 41
  - RFC 6068, 48, 269
  - RFC 6144, 169, 269
  - RFC 6265, 55, 269
  - RFC 6274, 150, 269
  - RFC 768, 87, 264
  - RFC 789, 138, 264
  - RFC 791, 29, 91, 107, 141, 142, 144, 147, 148, 150, 156, 264
  - RFC 792, 151, 264
  - RFC 793, 81, 89–91, 95, 97–99, 101, 102, 124, 264
  - RFC 813, 103, 264
  - RFC 819, 32, 264
  - RFC 821, 63, 252, 264
  - RFC 822, 40
  - RFC 826, 154, 249, 264
  - RFC 854, 253
  - RFC 879, 94, 264
  - RFC 893, 231, 264
  - RFC 894, 232, 245, 264
  - RFC 896, 98, 107, 264
  - RFC 952, 32, 264
  - RFC 959, 44, 46, 169, 250, 264
  - RFC 974, 62, 264
  - RIP, 170, 252
  - RIR, 252
  - Robustness principle, 96
  - root nameserver, 252
  - round-trip-time, 252
  - router, 252
  - Routing Information Protocol, 170
  - RPC, 252
  - RTS, 225
  - RTS frame (802.11), 244
- ## S
- SDU, 12
  - SDU (Service Data Unit), 252
  - segment, 23, 252
  - selective acknowledgements, 78
  - selective repeat, 77
  - sendto, 56
  - sequence number, 72
  - Serial Line IP, 228
  - service access point, 11
  - Service Data Unit, 12
  - service primitives, 12
  - Service Set Identity (SSID), 245
  - shared-cost peering relationship, 178
  - Short Inter Frame Spacing, 222
  - sibling peering relationship, 178
  - SIFS, 222
  - SLAC, 166
  - slot time (Ethernet), 221
  - slotted ALOHA, 217
  - slotTime (CSMA/CA), 223
  - SMTP, 252
  - SNMP, 252
  - SOCK\_DGRAM, 56
  - SOCK\_STREAM, 56
  - socket, 56, 252
  - socket.bind, 59
  - socket.close, 57
  - socket.connect, 57
  - socket.recv, 57
  - socket.recvfrom, 59
  - socket.send, 57
  - socket.shutdown, 57
  - source routing, 131
  - speed of light, 218
  - split horizon, 136
  - split horizon with poison reverse, 136
  - spoofed packet, 252
  - SSH, 252
  - SSID, 245
  - standard query, 252
  - Starting Delimiter (Token Ring), 227
  - Stateless Address Configuration, 166
  - stream-mode data transfer, 17
  - stub domain, 175
  - stuffing (bit), 212
  - stuffing (character), 213
  - subnet mask, 142
  - switch, 234, 252
  - SYN cookie, 252
  - SYN cookies, 93
- ## T
- TCB, 252
  - TCP, 89, 252
  - TCP Connection establishment, 90
  - TCP connection release, 95
  - TCP fast retransmit, 103
  - TCP header, 89
  - TCP Initial Sequence Number, 91
  - TCP MSS, 94
  - TCP Options, 94
  - TCP RST, 92

TCP SACK, 104  
TCP selective acknowledgements, 104  
TCP self clocking, 105  
TCP SYN, 90  
TCP SYN+ACK, 90  
TCP/IP, 252  
TCP/IP reference model, 23  
telnet, 253  
Tier-1 ISP, 194  
Time Division Multiplexing, 216  
Time To Live (IP), 147  
time-sequence diagram, 12  
TLD, 253  
TLS, 253  
Token Holding Time, 228  
Token Ring data frame, 227  
Token Ring Monitor, 227  
Token Ring token frame, 227  
traceroute, 153  
traceroute6, 165  
transit domain, 175  
Transmission Control Block, 97  
transport clock, 83  
Transport layer, 23  
two-way connectivity, 140

## U

UDP, 86, 253  
UDP Checksum, 88  
UDP segment, 87  
unicast, 253  
Unique Local Unicast IPv6, 160  
unreliable connectionless service, 13

## V

virtual circuit, 129  
Virtual LAN, 240  
VLAN, 240  
vnc, 253

## W

W3C, 253  
WAN, 253  
Wavelength Division Multiplexing, 215  
WDM, 215  
WiFi, 241

## X

X.25, 253  
X11, 253  
XML, 253