

# Index

- 2FA, *see* authentication
- 32-bit, 36
- 3DES, 138, 288, 291, 293
- 64-bit, 32
- access code, *see* Dropbox
- Access-Accept, 212
- Access-Reject, 224
- account, 207
- accounting, 218
- ACL, 185
- Active Directory, 206
- address
  - assign, 58
  - dynamic, 219
  - fake, 76
  - global unicast, 357
  - interface, 97
  - IP, 32
  - IPv4, 23, 68
  - IPv6, 58, 99, 125, **355**
  - link-local, 357
  - MAC, 37
  - multicast, 161, 168
  - private, 115
  - translation, *see* NAT
  - unique local, 357
  - virtual, 155, 156
- ADSL, 244
- advbase, 156, 164
- advertising frequency, 164, 166
- advskew, 164
- AES, 132, 138, 141, 289
- AES-NI, 137, 291, 292
- AH, *see* IPsec
- alert, 270
- algorithm, 119, 149, 288
- Annex J, 244
- anti spoofing, 68, 76
- Antivirus, 180
- API, 219, 275, 315, **329**
- ARP, 255, 297, 357
- attack, 259
- authentication, 180, **203**, 307
  - two-factor, 109, 144, 221
  - VPN, 118, 136, 149
- AuthenticationFactory, 225
- authorization, 203
- automation, 80, 275
- backup, 156, 313
- bandwidth limitation, 108
- Bash, 220, 312
- beep, 53
- benchmark, 302
- best practice, 301
- binat, *see* NAT
- bind, 223

- bitmask, 287
- blacklist, 186
- block, 71
- Blowfish, 138, 288, 293
- bridge, *see* network bridge
- browser, 338
- buffer, 126, 289
  
- CA, *see* certificate authority
- cache, 180, 199, 297
- Camellia, 138
- captive portal, 225
- CARP, **153**, 190, 230
- CAST, 138
- category, 181, 326
- category filter, *see* filter
- certificate, 59, 137, 145, 150, 194, 206, 215, 315, 339
- certificate authority, 195, 215, 339
- charon, 129
- Chatbot, *see* Telegram
- check, 233
- children, 119
- Cisco, 323
- ClamAV, 200
- CLI, 271
- clog, 79
- cluster, 154, 190
- collector, 174, 175
- command line, 271
- compression, 149
- condition, 270
- configd, 271
- configuration, 55, **311**, 369
- connection setup, 118
- console, 55, 59
- controller, *see* MVC
  
- core, *see* CPU core
- CPU, 23
- CPU core, 293
- cpuset, 287
- cron, 272, 313
- crypto key, 150
- curl, 88, 95, 219, 312
- CVE, 263
  
- dashboard, 25, 254
- dead peer detection, 118, 124
- Debian, 33, 174
- default route, 62
- DES, 138, 288, 293
- DF bit, 295
- DHCP, 249
- DHCPv6, 253
- direction, 68
- Directory as a Service, 213
- disk, 28
- distinguished name, 214
- DNS, 59, 249
- domain, 59, 206
- DoS, 108
- dpinger, 241
- Drive, *see* Google Drive
- Dropbox, 312
- DSL, 243
- dual stack, 252, 254
- DynDNS, 257
  
- e1000, 57, 284
- Easy Editor, 360
- editor, 321, **359**
- EICAR, 200
- election, 164
- Emerging Threats, 269

- encryption, 118
- errata, 369
- ESP, *see* IPsec
- ESXi, *see* VMware
- factory default, 23
- factory reset, 301
- failover, 158, 165, 238
- failure protection, 230, 235
- file system, 50, 327
- filter, 181, 183
  - LDAP, 208
  - operation, 87
  - rule, *see* firewall rule
- firewall, 32, 67, 237, 254, 275
  - backup, 154
  - rule, 70, 94, 106, 120, 142
  - transparent, 83
  - troubleshooting, 81
  - uncover, 89
- firmware, 59
- first match, 68
- flash drive, 36
- flash memory, 51
- floating rule, 68, 81
- flow, *see* NetFlow
- FreeBSD, 19, 26, 50, 57, 82, 101, 129, 165, 199, 359
- FreeOTP, 109
- gateway, 61, 233
  - group, 235
- generator, 221
- GeoIP, 77
- GET, 331
- Git, 311, 319
- GitHub, 312, 369
- global unicast, *see* address
- GoDaddy, 215
- Google, 250
- Google Authenticator, 109
- Google Drive, 315
- group, *see* firewall
- hard disk mirror, 50
- hardware, 45
- header, 115, 295
- health check, 233
- heartbeat, 154
- HMAC, 150
- hostname, 59
- hypervisor, 37
- ICAP, 200
- ICMP, 255
- identifier, 128
- IDS, 259, 335
  - rule, 270
  - transparent, 265
- ifconfig, 283
- ifinfo, 283
- iftop, 283
- IKE, 118, 123, 128, 130, 138
- in-band, *see* management
- inspect, 74
- inspection, 193
- instance, 141
- interface, *see* network card
- interface identifier, *see* IPv6
- Internet, 246
- Internet Key Exchange, *see* IKE
- interrupt, 286
- introduction, 23
- intrusion detection, *see* IDS

- IP
  - address, *see* address
  - monitor, 233
  - virtual, 93, 156
- iperf, 290, 302
- IPS, 264
- IPsec, **115**, 137, 204, 225, 292, 295
  - throughput, 288
  - troubleshooting, 127
- ipsec, 129
- IPTV, 246
- IPv4, 251
- IPv6, 61, 64, 99, 167, 177, 199, 240, 252, **355**
- ISC, 250
- ISO file, 36
- ISP, 77, 230, 234, 243
- ITU-T, 244
- jq, 334
- JSON, 219, 331
- JumpCloud, 213
- keepalive, 154
- kernel, 59, 268, 291
- Key, 250
- key, 128, 144, 275, 304, 305, 333
  - pre-shared, 136
  - public, 306
- keyboard, 52
- kldstat, 291
- lab
  - network, 27, 369
  - server, 33
- latency, 235
- LDAP, 204, 215, 221
  - filter, 208
  - troubleshooting, 222
- Legacy, 141
- LibreSSL, 292
- license, 78
- lighttpd, 340
- link-local, *see* address
- live image, 36
- load balancing, 165
- load distribution, **229**, 231
- load sharing, 235
- log, 51, 59, 71, 79, 181, 212
- login, 24, 221
- management, **103**, 255
- masquerading, 96
- master, *see* CARP
- MaxMind, 77, 78
- memory, 28
- mesh, 131
- MFA, *see* authentication
- Microsoft, 203
- mirror, 50
- mirror port, 260, 322
- mode, *see* OpenVPN
- Model View Controller, 331
- modem, 244
- module, 291
- monitoring, 59, 239
- monowall, 19
- more, 359
- MPD5, 256
- MSS, 294
- mssfix, 297
- MTU, 61, 248, 290, **294**
- Multi-WAN, 229
- multicast, 246, 256
- MVC, 331

- NAT, **91**, 122, 158, 237, 251
  - reflection, 101
  - rule, 81, 85
  - traversal, 122
- NDP, 357
- NetFlow, 171
- netstat, 143, 283
- network
  - bridge, 84, 87, 249, 266, 322
  - card, **60**
  - policy, 211
- network adapter
  - assign, 57
  - name, 57
  - virtual, 283
- Network Policy Server, 210
- nfdump, 174
- NIST, 289
- normalization, *see* rule
- NPS, 209
- NPTv6, 99, 240
- offload, 286
- open source, 17
- OpenBSD, 165
- OpenSSL, 132, 135, 151, 292
- openssl, 315
- OpenVAS, 260
- OpenVPN, **135**, 204, 292
  - GUI, 148
  - troubleshooting, 149
- operating system, 49
- opn-cli, 274
- Oracle, 41
- organizational unit, 206
- OTP, 221
- OTP seed, 109
- out-of-band, *see* management
- P12, 316
- packet filter, **67**, 83
- packet loss, 235
- PAM, 225
- password, 24, 59, 203, 213, 221, 307
  - time-based, 109
- PAT, 96
- pattern, *see* regular expression
- PCnet, 57
- PCRE, *see* regular expression
- peer-to-peer, 133
- performance, 281
  - encryption, 137
- pf, 79, 102, 241
- pfctl, 283
- pfSense, 19, 340
- pfsync, 160, 168
- pftop, 283
- PHP, 225, 340
- phpVirtualBox, 41
- physdiskwrite, 47
- PIN, 109, 221
- ping, 63, 88, 295
- pipe, *see* bandwidth limitation
- PKI, 150
- plug-in, 52, 79, 132, 200, 274
- policy, 184, 211
- policy tester, 188
- port forward, 93, 98, 198
- port group, 38
- POST, 331
- PPPoE, 245
- pre-shared key, 128, 136
- prefix, 61, 100, 240, **356**

- delegation, 252
- processor, 23
- programming, 329
- promiscuous mode, 267
- protocol, 203
- proxy, 138, **179**
  - ARP, 97
  - cluster, 190
  - explicit, 182
  - HTTPS, 193
  - transparent, 197
  - troubleshooting, 189
  - web, 204
- PuTTY, 305
- puttygen, 305
- Python, 272, 274, 329
  
- QR code, 109
- quick, 81
- quickstart, 23
  
- RADIUS, 204, 209, 217, 221
  - troubleshooting, 223
- radvd, 256
- rdr, 102
- Redis, 200
- regular expression, 184, **363**
- reject, 71
- reset, 307
- REST, 329
- restore, 277
- RFC2544, 290
- RFC5737, 33
- RFC6296, 240
- route, 62
- router
  - advertisement, 256
  - default, 62
  - DSL, 243
- routing
  - asymmetric, 162
  - prefix, 356
  - static, 61
  - table, 61
  - throughput, 286
- rule
  - automation, 80
  - filter, *see* firewall rule
  - floating, 81
  - normalization, 296
  - order, 80
  - time-based, 74
- ruleset, 68, 72, 87, 262
  
- sAMAccountName, 208
- scope, 199
- secure shell, 59
- SecureCopy, 319
- setup, 24
- SFTP, 322
- SHA, 132, 138, 141
- shaper, 108
- signature, 263
- skew, 164
- SLAAC, 253
- smartphone, 221
- snapshot, 50, 327
- SOCKS, 180
- source NAT, *see* NAT
- span port, 322
- spoofing, *see* anti spoofing
- Squid, 183, 199
- SSH, 24, 88, 204, **304**
- SSL, 193, 215

- SSL inspection, 193
- state table, 160
- strongSwan, 129, 292
- supervectoring, 244
- Suricata, 268
- switch, 31
- synchronization, 160, 164
- sysctl, 295
- syslog, 323
- systat, 283
- system
  - embedded, 46
  - sound, 53, 59
- TAP, 145
- Telegram, 323
- tester, 221
- throughput, 281, 302
- tier, 235
- time, 59
- timestamp, 218
- TLS, 151, 193, 206, 215
- TLS inspection, 193
- token, 221
- token generator, 109
- top, 282
- traceroute, 64, 126, 143, 157
- traffic analysis, 257
- traffic shaper, 108, 257
- transparent, 83
- TUN, 145
- tuning, 281
- tunnel, 115
  - client-server, 144
  - IPsec, 115
  - OpenVPN, 135
  - site-to-site, 120, 140
  - two-factor authentication, 109, 144, 221
- unique local, *see* address
- Unix, 281
- update, 59
- URL filter, *see* filter
- USB, 36
- user space, 137
- UUID, 276
- vboxmanage, 42
- VDSL, 243
- vectoring, 244
- versioning, 314
- view, *see* Model View Controller
- Vim, 360
- virtio-net, 57, 284
- virtual
  - IP, *see* IP
  - network adapter, 283
  - switch, 38
- VirtualBox, 41, 52
- virtualization, 30
- virus, 180, 200
- VLAN, 32, 45, 246
- vlance, 285
- VMware
  - ESXi, 37, 284
  - tools, 52
  - Workstation, 36
- VMXNET, 284
- voucher, 226
- VPN
  - compression, 149
  - dial-in, 131, 145
  - error pattern, 127

- IPsec, 115
- OpenVPN, 135
- throughput, 126
- Tinc, *see* Tinc VPN
- VRRP, 154
- vulnerability scanner, 261
  
- WAN, 229
- web cache, *see* cache
- web GUI, 59
- web proxy, *see* proxy
- Windows, 148, 206, 322
- WinSCP, 322
- wizard, 24, 146
  
- XCy, 244
- XML, 273
- XMLRPC Sync, 162, 191
  
- ZeroTier, 133
- ZFS, 50, 327