

# Index

- 2FA, *see* authentication
- 32-bit, 36
- 3DES, 140, 284, 287, 289
- 64-bit, 32
  
- access code, *see* Dropbox
- Access-Accept, 210
- Access-Reject, 222
- account, 205
- accounting, 216
- ACL, 186
- Active Directory, 204
- address
  - assign, 58
  - dynamic, 217
  - fake, 76
  - global unicast, 351
  - interface, 97
  - IP, 32
  - IPv4, 23, 68
  - IPv6, 58, 99, 125, **349**
  - link-local, 351
  - MAC, 37
  - multicast, 163, 170
  - private, 115
  - translation, *see* NAT
  - unique local, 351
  - virtual, 157, 158
- ADSL, 242
  
- advbase, 158, 166
- advertising frequency, 166, 168
- advskew, 166
- AES, 133, 140, 143, 285
- AES-NI, 139, 287, 288
- AH, *see* IPsec
- alert, 265
- algorithm, 120, 151, 284
- Annex J, 242
- anti spoofing, 68, 76
- Antivirus, 182
- API, 217, 271, 311, **325**
- APU, 47, 243
- ARP, 252, 293, 351
- attack, 255
- authentication, 182, **201**, 303
  - two-factor, 109, 146, 219
  - VPN, 118, 138, 151
- AuthenticationFactory, 223
- authorization, 201
- Automation, 80, 271
  
- backup, 158, 309
- bandwidth limitation, 108
- Bash, 218, 308
- beep, 53
- benchmark, 298
- best practice, 297
- binat, *see* NAT

- bind, 221
- bitmask, 283
- blacklist, 186
- block, 71
- Blowfish, 140, 284, 289
- bridge, *see* network bridge
- browser, 333
- buffer, 127, 285
  
- CA, *see* certificate authority
- cache, 182, 199, 293
- Camellia, 140
- captive portal, 223
- CARP, 155, 190, 228
- CAST, 140
- category, 183, 322
- category filter, *see* filter
- certificate, 59, 139, 147, 152, 193, 204, 213, 311, 335
- certificate authority, 194, 213, 335
- charon, 129
- Chatbot, *see* Telegram
- check, 231
- Cisco, 319
- ClamAV, 199
- CLI, 267
- clog, 79
- cluster, 156, 190
- collector, 176, 177
- command line, 267
- compression, 151
- condition, 265
- configd, 267
- configuration, 55, **307**, 363
- connection setup, 118
- console, 55, 59
- controller, *see* MVC
  
- core, *see* CPU core
- CPU, 23
- CPU core, 289
- cpuset, 283
- cron, 268, 309
- crypto key, 152
- cur1, 88, 95, 217, 308
- CVE, 259
  
- dashboard, 25, 251
- dead peer detection, 118, 124
- Debian, 33, 176
- default route, 63
- DES, 140, 284, 289
- DF bit, 291
- DHCP, 247
- DHCPv6, 251
- direction, 68
- Directory as a Service, 211
- disk, 28
- distinguished name, 123, 212
- DNS, 59, 247
- domain, 59, 204
- DoS, 108
- dpinger, 239
- Drive, *see* Google Drive
- drop, 265
- Dropbox, 307
- DSL, 241
- dual stack, 250, 252
- DynDNS, 254
  
- e1000, 57, 280
- Easy Editor, 354
- editor, 317, **354**
- EICAR, 200
- election, 166

- Emerging Threats, 265
- encryption, 118
- errata, 363
- ESP, *see* IPsec
- ESXi, *see* VMware
  
- factory default, 23
- factory reset, 297
- failover, 160, 167, 237
- failure protection, 228, 233
- filter, 183, 185
  - LDAP, 207
  - operation, 87
  - rule, *see* firewall rule
- firewall, 32, 67, 235, 252, 271
  - backup, 156
  - rule, 70, 94, 106, 120, 144
  - transparent, 83
  - troubleshooting, 80
  - 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, 81, 101, 129, 167, 198, 353
- FreeOTP, 110
  
- gateway, 61, 231
  - group, 233
- generator, 219
- GeoIP, 77
- GET, 327
- GitHub, 308, 363
- global unicast, *see* address
  
- GoDaddy, 213
- Google, 248
- Google Authenticator, 110
- Google Drive, 311
- group, *see* firewall
  
- hard disk mirror, 50
- hardware, 45
- header, 115, 291
- health check, 231
- heartbeat, 156
- HMAC, 152
- hostname, 59
- hypervisor, 38
  
- ICAP, 200
- ICMP, 252
- IDS, 255, 331
  - rule, 265
  - transparent, 261
- ifconfig, 279
- ifinfo, 279
- iftop, 279
- IKE, 118, 123, 128, 130, 140
- in-band, *see* management
- Inspect, 74
- inspection, 192
- interface, *see* network card
- interface identifier, *see* IPv6
- Internet, 244
- Internet Key Exchange, *see* IKE
- interrupt, 282
- introduction, 23
- intrusion detection, *see* IDS
- IP
  - address, *see* address
  - monitor, 231

- virtual, 93, 158
- iperf, 286, 298
- IPS, 260
- IPsec, **115**, 139, 202, 223, 288, 291
  - throughput, 284
  - troubleshooting, 127
- ipsecc, 129
- IPTV, 244
- IPv4, 249
- IPv6, 61, 99, 169, 179, 198, 238, 249, **349**
- ISO file, 36
- ISP, 77, 228, 232, 241
- ITU-T, 242
  
- JSON, 217, 327
- JumpCloud, 211
  
- keepalive, 156
- kernel, 59, 263, 287
- key, 128, 271, 300, 301, 329
  - pre-shared, 138
  - public, 302
- keyboard, 52
- kldstat, 287
  
- lab
  - network, 27, 363
  - server, 33
- latency, 233
- LDAP, 202, 212, 219
  - filter, 207
  - troubleshooting, 220
- LibreSSL, 288
- license, 77
- lighttpd, 335
- link-local, *see* address
- live image, 36
  
- load balancing, 167
- load distribution, **227**, 229
- load sharing, 233
- log, 51, 59, 71, 79, 183, 210
- login, 24, 219
  
- management, **103**, 253
- masquerading, 96
- master, *see* CARP
- MaxMind, 77
- memory, 28
- mesh, 132
- MFA, *see* authentication
- Microsoft, 201
- mirror, 50
- mirror port, 256, 318
- mode, *see* OpenVPN
- Model View Controller, 327
- modem, 243
- module, 287
- monitoring, 59, 237
- monowall, 19
- more, 353
- MPD5, 253
- MSS, 290
- mssfix, 293
- MTU, 61, 245, 286, **290**
- Multi-WAN, 227
- multicast, 244, 254
- MVC, 327
  
- NAT, **91**, 122, 160, 235, 249
  - reflection, 101
  - rule, 81, 85
  - traversal, 122
- NDP, 351
- NetFlow, 173

- netstat, 145, 279
- network
  - bridge, 84, 87, 247, 262, 318
  - card, **60**
  - policy, 209
- network adapter
  - assign, 57
  - name, 57
  - virtual, 279
- Network Policy Server, 208
- nfdump, 176
- NIST, 285
- normalization, *see* rule
- NPS, 207
- NPTv6, 99, 238
  
- offload, 282
- open source, 17
- OpenBSD, 167
- OpenSSL, 133, 137, 153, 288
- openssl, 311
- OpenVAS, 256
- OpenVPN, **137**, 202, 288
  - GUI, 149
  - troubleshooting, 151
- operating system, 49
- opn-cli, 270
- Oracle, 41
- organizational unit, 205
- OTP, 219
- OTP seed, 110
- out-of-band, *see* management
  
- P12, 312
- packet filter, **67**, 83
- packet loss, 233
- PAM, 223
  
- password, 24, 59, 201, 212, 219, 303
  - time-based, 109
- PAT, 96
- pattern, *see* regular expression
- PC-Engines, 47, 243
- PCnet, 57
- PCRE, *see* regular expression
- peer identifier, 128
- peer-to-peer, 133
- performance, 277
  - encryption, 139
- pf, 78, 102, 239
- pfctl, 279
- pfInfo, 74
- pfSense, 19, 336
- pfsync, 162, 170
- pftop, 279
- phase, *see* IKE
- PHP, 223, 336
- phpVirtualBox, 42
- physdiskwrite, 47
- PIN, 109, 219
- ping, 63, 88, 291
- pipe, *see* bandwidth limitation
- PKI, 152
- plug-in, 52, 79, 133, 199, 270
- policy, 188, 209
- port forward, 93, 98, 197
- port group, 39
- POST, 327
- PPPoE, 243
- pre-shared key, 128, 138
- prefix, 61, 100, 238, **350**
  - delegation, 249
- processor, 23
- programming, 325

- promiscuous mode, 262
- protocol, 201
- proxy, 140, **181**
  - ARP, 97
  - cluster, 190
  - explicit, 184
  - HTTPS, 192
  - transparent, 197
  - troubleshooting, 189
  - web, 202
- PuTTY, 301
- puttygen, 301
- Python, 268, 270, 325, 330
  
- QR code, 110
- quick, 81
- quickstart, 23
  
- RADIUS, 202, 207, 214, 219
  - troubleshooting, 221
- radvd, 254
- rdr, 102
- regular expression, 186, **357**
- reject, 71
- reset, 303
- REST, 325
- restore, 273
- RFC2544, 286
- RFC5737, 33
- RFC6296, 238
- route, 62
- router
  - advertisement, 253
  - default, 63
  - DSL, 241
- routing
  - asymmetric, 164
  - prefix, 350
  - static, 61
  - table, 61
  - throughput, 282
- rule
  - automation, 80
  - filter, *see* firewall rule
  - floating, 81
  - normalization, 292
  - order, 79
  - time-based, 75
- ruleset, 68, 72, 87, 258
  
- sAMAccountName, 206
- scope, 198
- secure shell, 59
- SecureCopy, 315
- setup, 24
- SFTP, 318
- SHA, 133, 140, 143
- shaper, 108
- signature, 259
- skew, 166
- SLAAC, 251
- smartphone, 219
- SOCKS, 182
- source NAT, *see* NAT
- span port, 318
- spoofing, *see* anti spoofing
- Squid, 185, 199
- SSH, 24, 88, 202, **300**
- SSL, 192, 213
- SSL inspection, 192
- state table, 162
- strongSwan, 129, 288
- supervectoring, 242
- Suricata, 264

- switch, 31
- synchronization, 162, 166
- sysctl, 291
- syslog, 319
- sysstat, 279
- system
  - embedded, 46
  - sound, 53, 59
- tap, 147
- Telegram, 319
- tester, 219
- throughput, 277, 298
- tier, 233
- time, 59
- timestamp, 216
- TLS, 153, 192, 204, 213
- TLS inspection, 192
- token, 219
- token generator, 109
- top, 278
- traceroute, 64, 126, 145, 159
- traffic analysis, 254
- traffic shaper, 108, 254
- transparent, 83
- tun, 147
- tuning, 277
- tunnel, 115
  - client-server, 146
  - IPsec, 115
  - OpenVPN, 137
  - site-to-site, 119, 142
- two-factor authentication, 109, 146, 219
- unique local, *see* address
- Unix, 277
- update, 59
- URL filter, *see* filter
- USB, 36
- user space, 139
- UUID, 272
- vboxmanage, 42
- VDSL, 241
- vectoring, 242
- versioning, 310
- view, *see* Model View Controller
- Vim, 354
- virtio-net, 57, 280
- virtual
  - IP, *see* IP
  - network adapter, 279
  - switch, 38
- VirtualBox, 41
- virtualization, 30
- virus, 182, 199
- VLAN, 32, 46, 243
- v lance, 281
- VMware
  - ESXi, 38, 280
  - Player, 37
  - tools, 52
  - Workstation, 36
- VMXNET, 280
- voucher, 224
- VPN
  - compression, 151
  - dial-in, 131, 146
  - error pattern, 127
  - IPsec, 115
  - OpenVPN, 137
  - throughput, 126
  - Tinc, *see* Tinc VPN

VRRP, 156  
vulnerability scanner, 257

WAN, 227  
web cache, *see* cache  
web GUI, 59  
web proxy, *see* proxy  
Windows, 150, 204, 318  
WinSCP, 318  
wizard, 24

XML, 269  
XMLRPC Sync, 164, 190

ZeroTier, 133