

# Index

## Symbols

0-day attack 295, 323  
3-way handshake 138  
3DES 69, 269

## A

A5/1 75, 206  
A5/2 206  
A5/3 206  
access 48  
access control  
  for CPU 264–265  
  for hardware units 263  
  hardware based 260  
  in Android 265  
  in file system 254–259  
  in memory 260–263  
access control list *see* ACL  
access control matrix (ACM) 252  
accountability 355  
ack 137, 138  
ACL 256, 257  
  compressed 255  
activation code 115  
active attacker 112  
active server page 166  
ActiveX 316  
  security 317  
actor 48  
actuator 4  
Ad hoc Mode 145  
ADB 331  
address 132  
administrator 251  
  privileges 255

Advanced Encryption Standard *see* AES  
Advanced Persistent Threat *see* APT  
AES 72–73, 269  
AKA 208  
amplification 215  
amplifier 215, 217  
analysis group 47  
Android 266  
Android Debug Bridge 331  
anomaly detection 196, 294  
ANT catalog 228  
anti-terror laws 352–353  
antivirus system *see* AV system  
API 267, 391  
App 391  
applet 166, 316  
  sandbox 316  
  security 316  
Application layer  
  encryption 172, 175–177  
application program 391, 393–394  
Application Program Interface *see* API  
APT 5, 330  
arbitrator 102  
architecture  
  client-server 3, 153  
  P2P 3  
ARP 141  
ARP cache 141  
ASCII character set 158  
ASP.NET 320  
asset 9, 48  
  data 9  
  equipment 9  
  software 9  
attack 41, 59, 212  
  0-day 295, 323

- adaptive chosen plaintext 59
  - brute-force 59, 101, 203, 241
  - chosen plaintext 59, 87
  - ciphertext alone 59
  - cold boot 269
  - costs 9
  - dictionary 241, 243
  - DoS 199, 211–218
    - countermeasures 218
    - distributed 216–217
    - in Application layer 211–213
    - in Internet layer 214–215
    - in Link layer 215
    - in Physical layer 215
    - in Transport layer 213–214
    - permanent 217
    - risks 218
  - known cleartext 307
  - known plaintext 59, 66
  - length extension 98
  - man-in-the-middle 29, 111, 112, 187, 199, 203, 209
  - psychological 18–27
  - redirection 173, 184
  - related key 59, 77, 206
  - ROCA 374
  - supply-chain 7
  - virus-based 290–291
  - worm-based 292
  - zero-day 272
  - attribute 299
  - attribution error, fundamental 24
  - AuC 149, 204, 207
  - authentication 107–111, 128
    - biometric 237–240
      - face recognition 238
      - finger pattern recognition 239
      - fingerprint 237
      - iris recognition 239
      - template 240
      - vein pattern recognition 240
    - evidence 107
    - kerberos 248–250
    - multi-factor 247
    - one-time password 245–246
    - password 241–246
    - pattern lock 246–247
    - pre-boot 269
    - protocol 107
    - server 108, 110, 201, 248
    - strong 107, 108
      - three-way 111
    - through the net 247–250
    - trends 247
    - weak 107
      - with PKCS 110–111
      - with SKCS 108–109
      - zero-knowledge 108
  - authentication code 245
  - authenticator 108, 249
  - Authenticode 317
  - authorisation 250
  - authoritative DNS-server 218
  - AV system 293–296
    - anomaly detection 294
    - behaviour based 293, 294
    - in telephone 295
    - misuse detection 294
    - signature based 293
  - availability 10, 12, 171, 211
  - avalanche effect 98
  - awareness campaign 342, 343
- B**
- backdoor 19, 289, 374
  - backup 337
  - base 400
  - Base Transceiver Station *see* BTS
  - base64 encoding 160, 306–307
  - baseline based analysis 197
  - basic authentication 305
  - Basic Service Set *see* WiFi BSS
  - bastion host 192, 194, 195
  - BCP 333–341
    - resource requirements 335
  - Big Brother society 353
  - bigram 63
  - binary data 66
  - binary digit 401
  - biometric authentication 237–240
  - biometric parameter 237
  - biometric property 388
  - BIOS 267, 273, 392
  - birthday paradox 97, 410
  - bit generator
    - period 74
    - pseudo-random 73
    - random 73
    - shift register based 74–75
  - BitLocker 268
  - Blaise de Vigenère 64
  - block cipher 101
    - mode 70–71, 73, 101, 184, 249
  - Bluebugging 204
  - Bluejacking 204
  - Bluesnarfing 204
  - Bluetooth

- authentication 202
  - encryption key 202
  - link key 202
  - pairing 202
  - security 202–204
  - SSP 203
  - BluRay disk 387
  - boot 392
  - boot loader 273
  - boot manager 273
  - boot sector 273
  - bootkit 267, 273
  - botnet 6, 8, 216
  - brain mode of operation 22
  - breach of copyright 350
  - bridge 142, 388
  - brute-force attack 59, 101, 203, 241
  - Btrfs 340
  - BTS 147
    - false 208–209
  - buffer overflow 282–284, 292
  - buffer overread 284–285
  - bus 381, 388
  - Business Continuity Planning *see* BCP
  - BYOD 210
  - bytecode 265, 316, 320
- C**
- C 283, 288
  - cache 141, 383
    - ARP 141
    - CPU 328, 383
    - disk 328
    - DNS 141, 218
    - HTTP 167, 168
  - cache poisoning 219
  - Caesar code 60
  - camera 388
  - canonification 299
  - capability 253
  - Capsicum 254
  - CAPTCHA 27
  - CBC 70, 101, 184, 185, 249
  - CCM 101, 185, 201
  - CD 387
  - Cellular Network Isolation Card *see* CNIC
  - Central Processing Unit *see* CPU
  - CEO fraud 21
  - certificate 110, 113–116, 175, 176
    - chain 116
    - EV 115
    - OCSP 188
    - qualified 121
    - revocation 114, 188
    - risks 187–188
    - root 116
    - self-signed 116, 118, 316
  - Certificate Authority (CA) 113
  - Certificate Revocation List *see* CRL
  - Certificate Signing Policy (CSP) 115
  - ChaCha20 78, 185
  - chain of responsibility 330
  - challenge-response 245
  - Change Permissions 259
  - checksum
    - CRC 200
    - cryptographic 95, 201
  - child pornography 350
  - Chinese remainder theorem 86, 406–407
  - CIA target 10, 128, 171
    - definition 10
  - CIP 226
  - Cipher Block Chaining *see* CBC
  - ciphertext 57, 58
  - CipherText Stealing *see* CTS
  - CIRP 335
  - Claude Shannon 66
  - client 3
  - client nonce 309
  - client-server architecture 153
  - cloud 3, 5, 87, 287, 294, 338, 358
  - cluster 5
  - CNIC 331
  - co-domain 399
  - COBIT 43
  - Code Red 293
    - signature 293
  - cognitive overload 27
  - cold site 340, 341
  - Colonial Pipeline 7
  - Common Criteria (CC) 275, 321, 375
    - environment 375
    - evaluation 276, 375, 377
    - life cycle 375
  - Common Name (CN) 114
  - communication node 125
  - communication plan 337
  - communication unit 389–390
  - community string 225
    - default 225
  - computer architecture 381
  - computer crime 348–353
  - computer forensics 327
  - computer system 4
  - concatenation 96, 100, 103
  - confidentiality 10, 12, 79, 171
  - conformance test 341

- confusion 66, 68
  - congruence 80
  - connection 128
  - connection oriented 137
  - connectionless 137
  - consent 354–356, 366
  - Content Management System (CMS) 319
  - control 39
  - control system 390
  - cookie 305, 309–312, 367
    - domain 310
    - expiry 310
    - HttpOnly 310
    - max-age 310
    - path 310
    - persistent 310
    - risici 311
    - secure 310
    - store 310
    - third-party 312, 367
  - Copy-on-write (COW) 340
  - core 382
  - COSO 43
  - Council of Europe convention
    - Cybercrime 348–352
      - extradition 352
      - international assistance 352
      - jurisdiction 351–352
      - procedural criminal law 350–351
      - substantive criminal law 349
      - substantive criminal law 350
    - Personal data 353
    - Terrorism 352–353
  - countermeasure 39, 41–42
  - Country (C) 114
  - COW 340
  - CPU 381
    - core 382
    - mode 264
  - critical asset 47
  - critical infrastructure 7, 226–228
  - CRL 114, 188
  - Cross-site scripting *see* XSS
  - cryptanalysis 59–60
    - differential 70
    - frequency analytic 61
  - cryptographic random number generator 67
  - Cryptolocker 6
  - cryptosystem 58
    - asymmetric 59, 79–88
    - broken 60
    - ElGamal 104
    - malleable 87, 103
    - reversible 103
    - symmetric 58, 60–78
  - CTS 249
  - cursor 387
  - customer profile 366
  - CVE system 271
  - cyberattack 5–9
  - Cyberincident Recovery Planning *see* CIRP
  - cyberspace 1
  - cybersquatting 26
  - cyberwar 8
  - cyclic permutation 60
- D**
- DAC 251
  - Dalvik 265
  - dark Internet 181
  - Data Encryption Standard *see* DES
  - data leakage 360
  - datamining 365–366
  - DDoS attack 211, 216–217
  - decapsulation 131
  - decryption 57
    - function 58
    - key 58
  - Deep Crack 69
  - DeMilitarized Zone *see* DMZ
  - deniable encryption 332
  - DES 68–71
  - dictionary attack 241
  - Diffie-Hellman key agreement 112
    - attack 112
    - in Bluetooth 203
  - diffusion 66, 68, 71
  - digest authentication 208, 305
  - digital signature 273
  - Digital Signature Standard *see* DSS
  - directory 253
  - Directory Information Tree *see* DIT
  - Disaster Recovery Planning *see* DRP
  - discoverable 203
  - Discretionary Access Control *see* DAC
  - discriminator 197
  - disk 383–387
    - copy 329, 330
      - bit-by-bit 329
      - file-by-file 329
    - forensic acquisition 332
    - mounted 329
    - sector 384
    - track 384
  - Distinguished Name (DN) 299
  - DIT 299, 300
  - divide-and-conquer 394

- DKIM 220, 222–224
    - signature 222
    - tag 223
  - DMZ 194, 195
    - split 194
  - DNS 119, 139–140, 156, 220
    - authentication 219
    - cache 141
    - confidentiality 220
    - integrity 219
    - operation 139
    - resolver 139, 141, 218
    - root server 139
    - RR 140
    - security 218–220
    - server 218
      - authoritative 218
      - false 219
    - zone transfer 140, 220
  - DNSSEC 219
  - domain 133–134, 399
  - Domain Name Service *see* DNS
  - DomainKeys Identified Mail *see* DKIM
  - DoS attack 143, 211–218
    - fast 211
    - slow 212, 213
  - driver 263, 267, 391
  - DRP 335–341
    - testing 341
  - DSA 104, 161
  - DSS 104–105
  - dual-homed host 192
  - DVD 387
  - dynamic analysis 288
  - dynamic packet filter 190
- E**
- E0 75, 202
  - EAL 276, 321, 375
  - EAP 201
  - eBay 118
  - ECB 70
  - ECDSA 104
  - economy
    - underground 9
  - EDGE 146
  - EDVAC 381
  - egress filter 190, 218
  - eID 119, 247
  - Electronic Codebook *see* ECB
  - electronic identity 121
    - authentication 121
    - quality of credential 121
    - quality of issuer 121
  - Electronic Patient Record 363
  - electronic signature 102–106, 110, 111, 113, 219
    - anonymous 369
    - future planning 106
    - requirements 102
    - verification 102–103
    - with appendix 104, 161
    - with PKCS 103–105
    - with recovery 103
  - encapsulation 131
  - encryption 57, 171–178
    - asymmetric 79–88
    - Full Disk (FDE) 268–270, 332
    - function 58
    - in Application layer 172, 175–177
    - in Internet layer 174
    - in Internet layer 173
    - in layered architecture 171–172
    - in Link layer 174
    - in operating system 268–270
    - in Physical layer 175
    - in Transport layer 173
    - key 58
    - symmetric 60–66
    - transparent 268
  - end systems 125
  - end-to-end 130
  - Enhanced privacy ID (EPID) 369
  - entertainment device 4
  - entry point 291
  - escaping 304
  - eStream stream cipher 78
  - Ethernet 143
    - switched 144
  - ethical hacker 295
  - ethics 364–369
  - EU Directive 353
  - EU Regulation 354
  - Euclid's algorithm 403–404
  - Euclid's extended algorithm 83, 87, 404–407, 409
  - Euler's totient function 81, 408
  - EV certificate 115
  - Evaluation Assurance Level *see* EAL
  - Evolved HSPA 146
  - exclusive or *see* XOR
  - exfiltration 6
  - existential forgery 100
  - exponent 113, 400
  - Extended Authentication Protocol *see* EAP
  - Extended Service Set *see* WiFi ESS
  - Extended Validation (EV) certificate 115

extension 114  
extradite-or-prosecute 352, 353

## F

face recognition 238  
Facebook *Like* 367  
Fail-safe Defaults 252  
FAIR 43  
false acceptance 237  
false negative 197, 294  
false positive 197, 294  
false rejection 237  
Faraday cage 329, 331  
FDE 268, 332  
fear appeal 30  
Feistel network 68–69  
fence register 260  
file  
  deletion 329  
file descriptor 285  
file protection  
  Unix 255–257  
    group 255, 257  
    owner 255, 257  
    problems 256  
    root 255  
    world 255  
  Windows 258–259  
    group 259  
file system 254, 392  
FileVault 268  
finger pattern 239  
fingerprint 237  
fingerprint reader 388  
FIPS Standard  
  140 374  
  197 72  
  PUB 46 68  
firewall 142, 189–196  
  application proxy 190  
  packet filter (PF) 189  
  personal 195–196  
  placement 192–194  
  residual risks 195  
  Stateful Packet Inspection (SPI) 190  
  tre-benet 194  
Firewire 388  
firmware 272, 392  
  BIOS 392  
flag  
  TCP 136  
flash drive 385  
flight mode 331

FNR 197  
forensic acquisition disk 332  
Forensic Toolkit (FTK®) 330  
forensics 327–333  
  encrypted data 332–333  
  memory 330  
  smartphone 330–331  
FPR 197  
frame 141  
FreeBSD 251, 254, 257, 268  
frequency analysis 61–63, 65  
  Al-Kindi 61  
Friedrich Kasiski 64  
Fuchsia 254  
Full Control 259  
Full Disk Encryption *see* FDE  
function 399–400  
  co-domain 399  
  compression 98  
  domain 399  
  graph 97, 399  
  image 399  
  linear 75, 400  
  non-linear 75, 98, 400  
  one-way 80, 96, 98  
  pre-image 96, 400  
  total 399  
  value 399  
fuzz test 287

## G

gateway 142  
GCC 288  
GDPR 353–362, 379  
  accountability 355, 361  
  authorities 360–362  
  certification 361  
  code of conduct 361  
  consent 354  
  controller 354  
  data class 356–357  
    sensitive 356  
  data protection impact assessment 359  
  Data Protection Officer (DPO) 360  
  European Data Protection Board 361  
  European Data Protection Supervisor (EDPS) 361  
  legal responsibility 362  
  personal data breach 354  
  pictures and sounds 357  
  processor 354  
  profiling 354, 366  
  pseudonymisation 354

- recipient 354
- rights 358–359
  - erasure 368
  - objection 366
- security of processing 359, 360
- security targets 359
- standard contractual clause 358
- Supervisory Authority 361
- third country 358
- GEA/3 206
- General Data Protection Regulation *see* GDPR
- geolocation software 135
- GPRS 146
- GPU 383, 387
- graphic user interface 387
- graphics card 387
- Graphics Processing Unit *see* GPU
- greatest common divisor 403
- group 255, 259
- GSM 146
  - authentication 204
  - encryption 204–206
  - security 204–206

**H**

- hack 40
- half open session 173
- Hamming weight 85
- Hard Disk Drive *see* HDD
- hard problem 82, 83, 88, 106
- hardening 192
- hardware 381–390
  - interface 388
- hash function
  - SHA-1 99
- hash function 99
  - collision resistant 96, 100
  - cryptographic 96–99
  - MD5 99, 101, 106
  - non-invertible 96, 100
  - one-way 96
  - security strength 97
  - SHA-1 101, 106
  - SHA-2 99, 105, 106
  - SHA-3 99, 105, 106
- HDD 384
- header 136
- health data
  - access 363–364
  - protection 363–364
- Heartbleed bug 284
- hexadecimal digit 401

- hibernate state 270
- HIDS 198
- HMAC 100
- Home Location Register (HLR) 148
- host 125
- hot site 340
- household apparatus 4
- HSM 220
- HTML 165, 210
  - anchor 166, 210
  - character code 165
  - href 166, 210
  - link 166
  - webform 313
- HTTP 162–169
  - applications 304–315
  - architecture 162
  - authentication 305–309
    - basic 305–306
    - digest 307–308
    - realm 305
    - vulnerabilities 309
  - authorisation 167
  - cache 167, 168
    - control 167
  - character set 167
  - cookie 305, 309–312, 367
    - non-essential 368
  - form dataset 314
  - header field 305
  - link 162
  - media type 167
  - method 166, 304
    - GET 163, 167, 168, 315
    - OPTIONS 168
    - POST 315
  - operation of 163
  - request 162, 167–168, 304
  - response 163, 168, 304
  - return code 163
  - script 305
  - SessionID 312–313
  - webform 305, 313–315
- human rights 351
- hyperlink 162
- hypertext 162
- Hypertext Markup Language *see* HTML
- Hypertext Transfer Protocol *see* HTTP
- hypervisor 265

## I

- I/O control hub 388
- I/O unit

- attachment 388–389
  - IANA 135, 136
  - IDE 331
  - identity module (IM) 148, 330
  - identity theft 366, 369
  - IDPS 196
  - IDS 196–199, 272
    - anomaly detection 196
    - in host 198
    - in network 198
    - misuse detection 196
  - IEEE Standard
    - 802 series 144
    - 802.1X 201, 202
    - 802.3 143
    - 802.11 144, 145
    - 802.11i 201
    - 802.15 144
    - 802.16 144
  - IEEE standard 1394 bus 388
  - IMAP 153
  - impact analysis 334
  - IMSI 148, 208
  - IMSI catcher 208
  - Incident Response 325
  - incomplete mediation 285
  - industrial espionage 330
  - Infrastructure Mode 145
  - ingress filter 190, 218
  - Initialisation Vector *see* IV
  - instruction 381
  - integer 397
  - integer factorisation
    - Fermat 84, 401–402
    - Number Field Sieve 86, 402
    - Quadratic Sieve 86, 402
  - integrity 10, 77, 87, 95–101, 171
  - International Mobile Subscriber Identity *see* IMSI
  - Internet layer 130
    - encryption 173–174
  - Internet name 119, 132–134
  - Internet of Things *see* IOT
  - interoperability 144
  - interpreter 316
  - Intrusion Detection System *see* IDS
  - inverse 81, 405, 409
  - investigation 350
  - IOT 4, 135, 147, 217, 378
  - IP address 132
    - range 221
  - IP Version 4 (IPv4) 134
  - IP Version 6 (IPv6) 134
  - IPsec 180
  - iris recognition 239
  - ISO Standard
    - 8859-1 159
    - 9796 103
    - 9798 110
  - ISO-latin-1 printable 242
  - ISO/IEC Standard
    - 11889:2009 269
    - 27000 series 44
    - 27005:2011 55
    - 27001 326, 378
    - 27002 11, 43
  - ISP 142
  - ITU-T Standard
    - X.500 series 299
    - X.520 301
  - IV 71, 74, 75, 97
- ## J
- Java 288, 316, 320
  - job scheduling 270
  - John von Neumann 381
  - jurisdiction 351–352
    - universal 352
- ## K
- KASUMI 206
  - Keccak 99
  - kerberos 111, 248–250, 309
  - Kerckhoff's Principle 58
  - key agreement 111
    - Diffie-Hellman 112
    - in Bluetooth 203
    - station-to-station 113
  - key distribution 111–113
  - Key Exchange Key (KEK) 273
  - key logger 292
  - key schedule 69, 72
  - key transport 111
  - key wheel 60, 61
  - Key-Scheduling Algorithm (KSA) 76
  - keyboard 387
  - keylogger 274
  - keyring 269
  - keystore 269
  - keystream 73
- ## L
- LAN 125, 144
  - layer
    - Application 131
    - Physical 131
  - LDAP 299



- attribute 299, 301
  - DIT 299, 300
  - escaping 304
  - injection 299–304
  - input control 304
  - metacharacters 304
  - object class 300
    - device 299
    - organization 299
    - organizationalUnit 299
    - person 299
  - search 302–304
    - base 302, 303
    - filter 303
    - scope 302
  - type control 304
  - URI 302
  - Least Privilege 251, 257
  - legal person 348
  - LFSR 74
    - period 74, 75
  - lifecycle 375
  - lifetime 111
  - Lightweight Directory Access Protocol *see* LDAP
  - Linear Feedback Shift Register *see* LFSR
  - link 162, 166, 210
  - link key 202, 203
  - Link layer 130
    - encryption 174
  - Lithium-ion (LiON) 390
  - Local Area Network *see* LAN
  - log file 327, 392
  - logic bomb 289
  - long-term key 76
  - LPC bus 389
  - LTE Advanced 147
- M**
- MAC 100, 251, 275
    - hash-based 100
  - MAC address 132
  - MAC key 100
  - MAC protocol 143
  - mail relay 156–157
  - Mail Transfer Agent *see* MTA
  - Mail User Agent *see* MUA
  - mailbox 153, 156
  - mainframe 5, 268
  - malicious code 289–296
  - malleable 77, 87, 103, 124
  - malware 2, 40, 267, 281, 289–296
    - backdoor 289, 374
    - logic bomb 289
    - rabbit 289
    - ransomware 289
    - spyware 289, 374
    - trojan horse 289
    - virus 289
    - worm 289
  - MAN 125, 144
  - Man-machine interface 387
  - Management Information Base (MIB) 225
  - Mandatory Access Control *see* MAC
  - Master Boot Record 267, 329
  - MBR 273
  - MD5 99, 101, 106, 168, 176, 309
  - Media Access protocol 143
  - mediation 285
  - memory 383
    - control hub 388
    - paging 261
    - physical 328
    - segmented 260
    - volatile 392
  - memory card 385, 386
  - memory leak 288
  - Memory Management Unit *see* MMU
  - memory unit 381
  - Merkle-Damgaard construction 98
  - message
    - corruption 128
    - forgery 128, 199
    - loss 128
  - Message Authentication Code *see* MAC
  - message digest 96, 104
    - function 96
  - message format 129
  - message key 105
  - metacharacters 298
  - metadata 268, 360
  - method 162
  - Metropolitan Area Network *see* MAN
  - Michael cryptographic checksum 201
  - Microsoft Exchange data breach 7
  - Milgram's eksperiment 21
  - MIME 158–162
    - entity 159
      - body 159
      - composed 161
      - content type 159
      - encoding type 159
      - header 159
    - header field 159
    - subtype 160, 176, 178
    - type 160, 176, 178
      - application 160, 176, 178

- message 162
- multipart 161, 176, 178
- MISTY1 206
- misuse detection 196, 294
- MLS 275
- MMI code 210
- MMI unit 387
- MMU 260
- mobile code 316–317
- mobile device security 209–211
- Mobile Station International Subscriber Directory Number *see* MSISDN
- mobile telephone network 146–149
  - 2G 146
  - 3G 146
  - 4G 147
  - 5G 147, 374
  - AuC 149
- authentication centre *see* AuC
- core network 147
- GPRS 146
- GSM 146, 147
- HLR 148
- security 204–211
- surveillance 208–209
- UMTS 146, 207–208
- VLR 148
- mobile unit 148, 330
- modular arithmetic 80–82
- modular exponentiation 81, 82, 105
- modular squaring 82
- modulus 104, 113
- monitoring
  - passive 199
- monoalphabetic cipher 61
- motivation 342
- motive 48
- mouse 387
- MSISDN 148
- MTA 156
- MUA 156
- multi-factor authentication 247
- Multi-Level Security *see* MLS
- multiprogramming 391
- Multipurpose Internet Mail Extensions *see* MIME
- MX record 156

## N

- name administrator 133
- native code 265, 317
- natural person 348
- NEED 217

- network 3–4
- Network access layer 131
- Network Enabled Embedded Device *see* NEED
- Network technology 141–149
- neural network 197
- NIDS 198
- non-repudiation 102, 128
- nonce 71, 74, 76, 77, 96, 107, 110, 111, 200, 208, 307, 309
  - definition 71
- nonce counter 309
- NotPetya 6
- NSA 228
- NTP 249
- number system 400
  - binary 401
  - hexadecimal 401
  - positional 401

## O

- object 250, 252
  - owner 251, 252
- OCSP 188
  - responder 188
  - response 188
  - stapling 188
- OCTAVE 43, 45–53
  - Phase 1 46–53
  - threat analysis 49–53
  - threat classes 48
    - definition 48
  - threat profile 48
    - access 48
    - actor 48
    - asset 48
    - motive 48
    - outcome 48
  - threat tree 48
- Office of Public Management (OPM) 5
- One-Time Pad 67–68
- one-time password 245–247
- one-way function 80
- OpenSSL 284
- operating system *see* OS
- oracle 100
- Organisation (O) 114
- Organizational Unit (OU) 114
- Orion 7
- OS 390–393
  - module 267
  - security 235–279
  - trusted 275

- updating 271–272
- OTP *see* one-time password
- OTP device 245
- outcome 48
- owner 255

## P

- padding 66, 87
- page 261
- page table 261
- pairing 202
- PAN 125, 144
- passive attacker 112
- passkey 247
- password 241–246
  - choice 243–245
  - protection 242–243
  - strength 241–242
- password tiredness 249
- pattern lock 246–247
- payload 136
- PCI Expressbus 388
- PDCA process 53, 54, 334
- PDoS 217
- peer-to-peer (P2P) 3, 216
- Pegasus 296
- pentest 287
- permissions 258
- person 347
- Personal Area Network *see* PAN
- personal data 354
  - protection 353–362
- personal firewall 195–196
- PGP 118, 175, 177
  - type 178
- phishing 25–27, 367
  - bait 25
  - e-mail 25, 26, 155
  - social media 25
- PHP 288, 320
- Physical layer 130, 131
  - encryption 175
- physical security 274
- pigpen cipher 63
- PKCS 59, 79–88
- PKCS#1 87, 104
- PKCS#7 161, 176
- PKCS#10 115
- PKCS#12 115, 121
- PKI system 113, 117
- plaintext 57, 58
- Platform Key (PK) 273
- point-to-point 143

- polyalphabetic cipher 64–65
- POP3 153
- port
  - allocated 135
  - freely available 136
  - registered 136
  - TCP 135–136
  - UDP 135–136
- port number 132
- Post-Quantum Cryptography *see* PQC
- power supply 390
- PQC 106
  - competition 106
- pre-boot authentication 269, 332
- preimage resistance 96
- prime factor 397
- prime number 397
  - mutual 403
- priming 23
- primitive polynomial 75
- Privacy-Enhancing Technology (PET) 368
- private key 79, 103, 104, 110
- privilege escalation 266, 296
- proactive control 244
- process hollowing 292, 294
- processor 381
- program 381
- program analysis
  - dynamic 288
  - static 288
- program vulnerability 281
- protection 391
- protection ring 264
- protocol 107
  - ARP 141
  - DNS 139–140
  - HTTP 162–169, 304–315
  - ICMP 215
  - IMAP 153
  - LDAP 299–304
  - POP3 153
  - SMTP 153–162, 220–224
  - SNMP 224–225
  - station-to-station 113
  - TCP 136–139, 213–214
- Protocol Control Information (PCI) 129
- proxy 192
- public key 103, 110
- Public Key Cryptosystem *see* PKCS
- Public Key Infrastructure *see* PKI

## Q

- qop 308

qualified certificate 121  
 quality of protection 307  
 quantum computer 88  
 query 319

## R

rabbit 289  
 race condition 286  
 Radio Network Controller *see* RNC  
 Rainbow Series 1  
 random permutation 61  
 ransomware 6, 289, 338  
 RC4 76–78, 200  
   keystream generator 76  
   vulnerabilities 185  
   weakness 76–78  
 reactive control 244  
 recovery  
   data 337–340  
   system functionality 340–341  
 Recovery Point Objective *see* RPO  
 recovery target 334  
 Recovery Time Objective *see* RTO  
 redirection attack 173, 184  
 Redline 330  
 redundancy 226, 335  
 Reference Monitor (RM) 236, 267–268, 376  
 reference number 95  
 register  
   CPU 383  
 Registration Authority (RA) 115  
 Registry 263  
   key 263  
   subkey 263  
 remote wipe 331  
 replaying 199  
 request 162  
 residual risk 39, 52  
   matrix 39, 53  
 resolver 139, 141, 218  
 resource 304  
 Resource Record (RR) 140, 156  
 response 163  
 return code 163  
 RFC 150  
 right 250, 358–359  
 right to be forgotten 368  
 Rijndael 72  
 risk 37, 38  
   analysis 45  
   avoidance 42  
   management 42  
   matrix 38, 52

mitigation 42  
   strategy 42  
 objective 37  
 reduction 42  
 residual 39  
 retention 42  
 sharing 42  
 subjective 37  
 transfer 42  
 RNC 207  
 roaming 148  
 Robust Security Network *see* RSN  
 robustness 288  
 ROCA attack 374  
 role 251  
 Role Based Access Control (RBAC) 251  
 root 251  
   privileges 255  
 root certificate 116, 118  
 root keys 263  
 root server 139  
 rootkit 266–267  
   BIOS 267  
   bootkit 267  
   kernel mode 267  
   user mode 266  
 round key 72, 269  
 router 132, 142–143  
 RPO 334, 337–341  
 RR 140, 156  
 RSA 82–88, 103, 113, 161, 407–409  
   key generation 83, 374  
   modulus 82  
   private exponent 82  
   private key 82  
   public exponent 82  
   public key 82  
   vulnerabilities 86–87  
 RSA number 85, 402  
 RSN 201  
 RTO 334, 337–341  
 rule of procedure 129

## S

S/MIME 161, 175, 177  
   type 176  
 safe harbour 358, 365  
 safe library 283  
 salt 243  
 sandbox 265  
 scheme 163, 164, 210  
 Schrems II 366  
 screen 387

- screened host 193
- screened subnet 194
- screening router 192
- script 305
- second-preimage resistance 96
- secret key 102, 108, 111
- Secret Key Cryptosystem *see* SKCS
- sector 384
- Secure Boot 272
- Secure Digital (SD) 386
- Secure Hash Algorithm (SHA) 176
- Secure Shell (SSH) 247
- security
  - breach 325
  - conditions 17
  - failure 281
  - incident 325
  - policy 11–12
  - strength
    - DSA signature 104
    - hash function 97, 106
  - target 9–10, 128
- security analysis
  - systematic 43–54
- security awareness 32, 342, 377
- security device 387
- security in depth 194
- security parameter 184
- security zone 317
- segment 260
- segment table 260, 261
- self-efficacy 31
- SELinux 251, 267, 376
- Semalt 6
- Sender Policy Framework *see* SPF
- sensor 4
- separation 250
- seq 136, 137
- sequence number 136
- server 3
- server script 166
- service 127
  - complex 2
  - connection-oriented 128
  - connectionless 128
  - cybercriminal 8
  - error-free 128
  - secure 128
  - sequence preserving 127
  - SMS 146
  - stream-oriented 129
- service extension 154
- servlet 319–320
- session key 175, 176, 205, 248, 249
- session theft 173
- SessionID 312–313
  - risici 312
- set 398
  - cardinality 398
  - containment 398
  - difference 398
  - intersection 398
  - membership 398
  - subset 398
  - union 398
- Set Groupid 257
- Set Userid 257
- setgid 257
- setuid 257
- SHA-1 99, 101, 106
- SHA-2 99, 105, 106, 309
- SHA-3 99, 105, 106
- shared medium 130, 143
  - cable-based 143–144
  - wireless 144–149
- side effect 315
- sidetabel 262
- signature 196, 293
- signature based analysis 196
- SIM card 148, 204
- Simple Mail Transfer Protocol *see* SMTP
- Simple Network Management Protocol *see* SNMP
- single sign-on (SSO) 249
- SKCS 59–78
- Slowloris 212
- smartcard 115, 121, 148, 236, 269
  - UICC 207, 331
- smartphone
  - forensics 330–331
- SMTP 153–162
  - command 153
  - error code 222
  - header line 157–158, 222
  - mailbox 153, 156
  - Message-ID 157
  - operation 154
  - response 153
  - risks 155
  - security 220–224
  - service extension 186
  - spoofing 155, 220
  - tracking 157
- Smurf attack 215
- snapshot 339
- sniffer 132, 143, 174
- SNMP 224
  - security 224–225

- social engineering 18, 241, 292
  - social media 25, 367
  - soft certificate 121
  - software 390–394
    - application 393–394
    - flaw
      - buffer overflow 282–283, 292
      - buffer overread 284–285
      - detection 286
      - incomplete mediation 285
      - malicious 281
      - non-malicious 281
      - stack overflow 282
      - TOCTTOU 285
    - injection 285
    - operating system 391–393
    - system utility 393
    - test 286
    - vulnerability 283, 292
  - Solid State Drive *see* SSD
  - sound card 387
  - spam mail 155
  - spearphishing 26
  - special permissions 258
  - SPF 220–222
    - mechanism 221
    - policy 221
    - qualifier 221
  - spoofing 220
    - DNS 217
    - e-mail 26, 155
    - ICMP 215
    - IP 173, 189
    - TCP SYN 213
  - spyware 289, 296, 312, 374
  - SQL injection 296–299
  - square-and-multiply method 85
  - SS code 210
  - SSD 385
    - wear levelling 385
  - SSID 145, 200
  - SSL 180, 182–187, 318
    - Alert protocol 183
    - Change Cipher Spec protocol 183
    - Handshake protocol 183–185
    - Record protocol 183
    - securing application protocols 185–187
    - security parameter set 184–185
  - stack 282
  - stack overflow 282
  - Standard Contractual Clause (SCC) 366
  - standby state 269
  - Stanley Milgram 21
  - STARTTLS 185–187
  - state machine 97
  - static analysis 288, 289
  - StingRay 209
  - storage unit 381
  - stream cipher 73
  - STRIDE 47
  - Stuxnet 6, 266
  - stylus 387
  - subject 250–252, 259
  - Subscriber Identity Module 148
  - substitution cipher 60–65
  - swap area 262, 268
  - switch 144, 174
  - symmetric stream cipher 73–78
    - eStream 78
    - RC4 76–78
  - SYN flood 213
  - SYN spoof 213
  - System 1 22
  - System 2 22
  - system history 327
  - system of systems 5
  - system program 390, 393
  - system state 327
    - volatile 328
  - system utility 393
- ## T
- tag 100
  - Take Ownership 259
  - TCP
    - flag 136, 137
    - operation 137–139
    - port 135–136
  - telephone modem 389
  - template 240
  - Temporal Key Integrity Protocol *see* TKIP
  - test
    - blackbox 287
    - fuzz 287
    - penetration 287
    - whitebox 287
  - texting 419
  - TGT 248
  - The Sleuth Kit (TSK) 330
  - threat 37
    - data related 41
    - hardware related 40
    - in IT system 40–41
    - liveware related 41
    - software related 40
  - threat analysis 49–53, 334
  - threat profile 47

threat tree 48  
 Ticket Granting Server (TGS) 248  
 Ticket Granting Ticket *see* TGT  
 tickets 248  
 tiered architecture 394  
 time stamp 95  
 Time-of-check to Time-of-use *see*  
     TOCTTOU  
 timeout time 213  
 TKIP 201  
 TLS 78, 180, 182–187, 318  
     Heartbleed 284  
 TOCTTOU flaw 285  
 Tor 181–182, 368  
 touch sensitive 387  
 tracking 366–368  
 transaction 367  
 transparent encryption 268  
 Transport layer 130  
     encryption 173  
 transposition cipher 65–66  
 trapdoor function 79–80  
 trigram 63  
 Triple-DES (3DES) 69, 176  
 trojan horse 28, 289  
 TrueCrypt 268  
 trust 158  
 trust model 117  
     hierarchical 117–118  
     reputation-based 117–119  
     web-of-trust 117–118  
 Trust Service Provider *see* TSP  
 Trusted Platform Module (TPM) 269  
 TrustedBSD 251  
 TSP 120  
 tunneling 178–180  
 type control 304

## U

UDP 139, 219  
     port 135–136  
 UEFI 273, 392  
     boot loader 273  
     boot manager 273  
     KEK 273  
     PK 273  
     trust 273  
 UMTS 146  
     AKA 208  
     authentication vector 207  
     security 207–208  
 Unified Extensible Firmware Interface *see*  
     UEFI

Uniform Resource Identifier *see* URI  
 Universal Serial Bus *see* USB  
 URI 162–164, 305  
     password 163  
     path 164  
     port number 164  
     query 164  
     scheme 163, 164, 210  
     userid 163  
 usability 178  
 USB 388  
     hub 388  
     key 386  
     port 385  
 user control 392  
 user interface 392  
 utility program 393

## V

vein pattern 240  
 Vigenère cipher 64–65  
     encoding table 65  
 virtual machine *see* VM  
 virtual memory 262  
 Virtual Private Network *see* VPN  
 virus 289  
     attack 290–291  
     code 291  
     concealment 290  
     execution 290  
     placement 290, 291  
 Visitor Location Register (VLR) 148  
 VM 265, 329  
     guest 265  
     host 265  
 Volatility 330  
 von Neumann architecture 382  
 VPN 178–182  
 vulnerability 37  
     psychological 38  
         affect 25  
         anchoring 23  
         attribution 24  
         belief in authority 20–22  
         curiosity 19  
         framing 24–25  
         helpfulness 19–20  
         sympathy and hate 20  
         uncertainty in decision making 23–25  
     technical 37

## W

walkthrough 341

- WAN 125, 144
  - WannaCry 271
  - warm site 340, 341
  - weakness 37
  - wear levelling 385
  - Web-of-trust 117
  - webform 305, 313–315
    - BUTTON element 313
    - checkbox 314
    - file 314
    - hidden field 314
    - INPUT element 313
    - menu 314
    - password 314
    - radio button 314
    - reset 313
    - risks 315
    - SELECT element 314
    - submit 313
    - TEXTAREA element 314
  - webserver
    - vulnerability 317–318
  - WEP 77, 200
  - whois 134
  - Wi-Fi Protected Access *see* WPA
  - Wide Area Network *see* WAN
  - WiFi 144–145
    - Access Point (AP) 145
    - authentication
      - 802.1X 201, 202
      - Open System 200
      - Shared Key 200
    - BSS 145
    - ESS 145
    - integrity
      - CCM 201
      - CRC 200
      - Michael checksum 201
    - mode
      - ad hoc 145, 146
      - infrastructure 145–147
    - RSN 201
    - SSID 145, 200
    - WEP 200
    - WPA 201
    - WPA2 201
  - WiMAX 147
  - Windows
    - VSS 340
    - XP 268, 376
  - wireless network 144–149
    - security 199–211
  - worm 289
    - attack 292
    - payload 292
    - propagator 292
  - WPA 201
  - WPA2 201
- ## X
- X-as-a-service 8
  - X.500 Directory 116, 299
  - X.500 name 114, 301
  - X.509v3 certificate 113
  - XOR function 67, 68, 73
  - XSS 318–319
- ## Z
- zero-day attack 272
  - ZFS 340
  - zombie 216
  - zone transfer 140, 220
  - Zone Walking 220