

# Subject index

Note: Page numbers in bold refer to figures and tables.

- achievability proof, **26**
  - channel coding, 30
  - channel model, 162
  - coded cooperative jamming, 285
  - cooperative jamming, 276
  - distributed source coding, 35
  - Gaussian broadcast channel with confidential messages, 179
  - Gaussian source model, 191
  - source coding, 27
- achievable rate, 25, 26, 34, 38, 42, 60, 79, 116, 118, 137, 145, 272
- advantage distillation, 136–143
  - capacity, **137**, 138
  - protocol, 136
  - rate, 137
- AEP, *see* asymptotic equipartition property
- AES, 248
- application layer, 254
- asymptotic equipartition property
  - conditional, 20
  - joint, 19
  - strong, 19
  - weak, 21
  - weak joint AEP, 22
- authentication, 251, 252, 264
  - unconditional, 252
- AWGN, *see* Gaussian channel
- base of logarithm, 15
- BEC, *see* binary erasure channel
- binary erasure channel, 7, **25**, 32, 53, 65, 84, 85, 90, 222, 223, 228, 229
- binary symmetric channel, **25**, 32, 62, 65, 84, 85, 90, 136, 222, 230, 233, 244
- binning, 92
- block cipher, 248
- broadcast channel with confidential messages, 78–103
  - Gaussian, 177–190
- broadcast channel, 40–44
- brute-force attack, 249
- BSC, *see* binary symmetric channel
- chain rule
  - entropy, 16
  - mutual information, 16
- channel
  - broadcast, *see* broadcast channel
  - code, *see* code
  - discrete memoryless, *see* discrete memoryless channel
  - Gaussian, *see* Gaussian channel
  - less capable, *see* less capable channel
  - multiple-access, *see* multiple-access channel
  - noisier, *see* noisier channel
  - ordered, 222
  - physically degraded, *see* physically degraded channel
  - stochastically degraded, *see* stochastically degraded channel
  - two-way wiretap, *see* two-way wiretap channel
  - weakly symmetric, 63, **63**, 65, 106
  - wiretap, *see* wiretap channel
- channel capacity
  - Gaussian channel, 32
- channel coding theorem, 29
- channel capacity, 26
- channel estimation, 264
- Chebyshev's inequality, **14**, 170, 171, 228
- Chernov bounds, **14**
- code, 26, 37, 41, 59, 68, 79, 91, 105, 272
  - linear, *see* linear code
- codebook, 26
- coded cooperative jamming, **273**, 283–289
- coherence interval, 194, **194**, 200, 203, 207
- computational security, 248–251
- concave, **17**
- conditional mutual information, **16**
- conditioning does not increase entropy, 16
- confidentiality, 251
- converse proof, **26**
  - broadcast channel with confidential messages, 98

- channel coding, 31
- channel model, 163
- cooperative jamming, 277
- degraded wiretap channel, 76
- distributed source coding, 36
- Gaussian broadcast channel with confidential messages, 179
- multiple-access channel, 40
- source coding, 28
- source model, 127
- wiretap channel with rate-limited feedback, 166
- convex, **17**
- convex hull, **38**, 75, 96
- cooperative jamming, 10, **273**, 275–283
- coset coding, 224
  - with dual of LDPC codes, 228–229
- coset code, 218, 224
- coset coding, 225
- cross-over probability, 25
- crypto lemma, 53, 56, 107, 120, 141
- data-processing inequality, **17**, 32, 60, 76, 77, 85, 128, 130
- degraded wiretap channel, 58
  - example, 65
- digital signature, 252
- discrete memoryless channel, 25
- discrete memoryless source, **25**, 33, **59**
- distributed source coding, 33
- DMC, *see* discrete memoryless channel
- DMS, *see* discrete memoryless source
- dual code, 218
- dummy message, 69, 92, 103, 286
- eavesdropper's channel, 58, 79
- entropy
  - binary entropy function, **15**
  - chain rule, 16
  - collision entropy, 149
  - conditional entropy, 15
  - differential entropy, 18
  - joint entropy, 15
  - min-entropy, 150
  - Rényi entropy, 151
  - Shannon entropy, **15**
- entropy–power inequality, **18**, 181
- equivocation, 5, **50**, 59, 79
- erasure probability, 25
- exponential-integral function, **202**, 206, 208
- extractor, **159**, 160
- fading
  - block fading, 194, 203–206
  - ergodic fading, 194–203
  - quasi-static fading, 194, 206–210, 244
- fading coefficient, **194**
- fading gain, **194**
- Fano's inequality, **17**, 29, 31, 51, 69, 76, 92, 98, 123, 127, 132, 138, 145, 163, 169, 205, 277, 286
- feedback
  - rate-limited, 105
  - secure, 105
- full secrecy, *see* secrecy condition
- functional dependence graph, **22**, 102
- generator matrix, 218
- GPRS, 258
- GSM, 258
- hash functions, 250
- IETF, 255
- integrity, 251
- intrinsic conditional information, 130
  - reduced, 133
- IP, 247
- IPSec, 256
- Jensen's inequality, **17**, 150, 153, 180, 181
- joint AEP, 39, 44
- kernel, **187**, 226
- key-distillation strategy, 113, 115, 278
- LDPC, *see* low-density parity-check code
- leakage, **50**, 59, 92, 116, 195, 272
- less capable channel, **87**, 88, 90
- linear code, 218, 224
  - coset, *see* coset code
  - dual, *see* dual code
  - syndrome, *see* syndrome
- link layer, 256
- local randomness, **59**, 67, 68, 79, 91, 103, 105, 113, 115, 136, 144, 272, 278, 285
- low-density parity-check codes, 217–223
  - message-passing, 220–222, 232–233
  - threshold, 222
- LTE, 259
- main channel, 58, 79
- Markov chain, **17**
- Markov's inequality, **13**, 160, 173
- multiple-access channel, 37–40, 284, 285
- mutual information, **16**
  - chain rule, 16
- near-field communication, 260
- network coding, 293
  - Byzantine attacks, 306
  - linear, 296
  - passive attacks, 303
  - protocols, 299
  - vulnerabilities, 302

- network error correction, 306
- network information theory, 33
- network layer, 255
- NIST, 250
- noisier channel, **86**, 88–90, 104, 106
- one-time pad, 5, 52, 249, 273, 289, 290
- one-way communication, 116, 119, 121, 145, 154
- optical communication, 257
- OSI Reference Model, 253
- outage probability, 208
- parity-check matrix, 218
- perfect secrecy, *see* secrecy condition
- physically degraded channel, **84**, 88, 108, 165
- privacy amplification, 148–162, 243
  - extractor, *see* extractor
  - universal hash function, *see* universal hash functions
- public-key cryptography, 249
- quantization, 127, 147
- random binning, **27**, 35, 123
- random coding, **30**, 39, 42, 65, 68, 90, 91, 285
- rate-equivocation region
  - broadcast channel with confidential messages, **79**, 80
  - degraded wiretap channel, **60**, 61
  - wiretap channel, **80**, 81
- reconciliation, 143–148, 231–242
  - binary source, 231–234
  - capacity, 145
  - continuous random variables, 147
  - direct reconciliation, **147**, 155
  - efficiency, 147
  - Gaussian source, 239–242
  - multilevel reconciliation, 235–239
  - protocol, **144**, 154, 161, 232, 235, 243
  - rate, 145
  - reverse reconciliation, **147**, 157
- RFID, 259
- RSA, 249
- secrecy-capacity region
  - broadcast channel with confidential messages, 81
  - Gaussian broadcast channel with confidential messages, 179
- secrecy capacity, 6
  - Gaussian wiretap channel, 185
  - wireless channel, 196, 204, 208
  - wiretap channel, **60**, 62, 168
- secrecy condition
  - full secrecy, **60**, 61, 65, 68, 70, 80, 91
  - perfect secrecy, **3**, **5**, 49–53, 55, 60, 117, 227, 305
  - strong secrecy, 55, 166
  - weak secrecy, 55, 166
- secret-key agreement, 112–176
  - channel model, 114, 278
  - Gaussian source model, 190
  - source model, 113
- secret-key agreement, 262
- secret-key capacity
  - channel model, **162**, 166, 277
  - source model, **118**, **119**, 138, 158
- secure channel codes, 261
- security services, 248, 251
- selection lemma, **14**, 27–29, 31, 36, 72, 94, 126, 288
- Shannon's cipher system, 4, 49
- side information, 37
- Slepian–Wolf code, 34
- Slepian–Wolf region, 34
- source
  - code, *see* source code
  - discrete memoryless, *see* discrete memoryless source
- source coding, 27
- source code, 25, 34
- source coding theorem, 26
- source coding with side information, 37
- spread spectrum, 257
- SSL, 255
- stochastically degraded channel, **84**, 85, 88, 90, 178, 196
- stochastic encoder, 59
- strategy, *see* key-distillation strategy
- stream cipher, 249
- strong secrecy, *see* secrecy condition
- strong secrecy capacity
  - wiretap channel, **61**, 168
- strong secret-key capacity
  - channel model, **162**, 166
  - source model, **118**, 158
- superposition coding, **42**, 66, 91–93
- symmetric encryption, 248
- syndrome, 218, 232
- Tanner graph, 218, 219
- TCP, 247
- time-sharing, 40, 276, 282, 290
- transport layer, 255
- two-way communication, 116
- two-way wiretap channel, 105, 270–275
  - Gaussian, 270
- typical set
  - consistency, 19
  - jointly typical set, 19

- typical set
  - jointly weak typical set, 21
  - strong typical set, 18
  - weak typical set, 21
- UMTS, 259
- universal families of hash functions, **152**, 252
- variational distance, **15**, 74, 159, 160
- Vernam's cipher, 5, 52
- weak secrecy, *see* secrecy condition
- wiretap channel, 6, 49
  - binary erasure, 54, 90, 223–231
  - binary symmetric, 90, 244
  - complex Gaussian, 185
  - degraded, **58**
  - type II, 227, 305
- wiretap code, 6
- X.800, 253