

# Index

- 8PSK 9
- adaptive filter 137
- adaptive modulation and coding (AMC) 4
- adjacent channel interference (ACI) 15, 180, 181
- amplitude shift keying (ASK) 9, 13–14
- analog-to-digital converter (ADC) 176, 178, 179, 180–181
- automatic gain control (AGC) 181
  
- Bell Labs Layered Space-Time, diagonal (D-BLAST) 161
- Bell Labs Layered Space-Time, horizontal (H-BLAST) 162
- Bell Laboratory layer Space Time, vertical (V-BLAST) 161, 164
- Barker codes 37
- beamforming 144
- belief propagation 54
- best linear unbiased estimator (BLUE) 100–101
- beyond 3G (B3G) 233
- bit reverse 198, 201, 239
- bit-true design 173, 189, 191–192
- blind estimator 116
- branch metrics 51–52
- butterfly 197, 200–202, 203, 205–206
  
- canonical sign digit 221, 230
- capacity 144, 145–146
  
- carrier frequency offset (CFO) 68–69, 76, 86, 88, 100–107
- carrier phase error 86
- c-element 213
- channel estimation 115–116
- channel impulse response (CIR) 96, 97, 98, 120, 126
- chip 38
- chip rate 38–39
- clipping error 176, 178, 183
- clipping noise 176, 178
- code rate 42, 48, 49, 53
- cognitive radio 243
- coherence bandwidth 63, 118
- coherence distance 66–67, 118
- coherence time 68
- coherent demodulation 85
- common phase error (CPE) 70, 107
- constraint length 49
- continuous-phase frequency shift keying (CPFSK) 11, 14
- convolutional code 48–50
- coordinate rotation digital computer (CORDIC) 218–220, 221–223, 225
- correlator bank 98, 100
- crest factor (CF) 176
- cyclic codes 44–45
- cyclic prefixing (CP) 20, 24–25, 91–92

- data-aided estimator 116  
 DC offset 70, 72–73, 76  
 decimation-in-frequency FFT 196, 198  
 decimation-in-time FFT 196–198  
 delay and correlate (DC) 92–93, 152  
 de-spreading 35, 38  
 digital modulation 9, 11  
 digital audio broadcasting (DAB) 2, 26  
 digital video broadcasting (DVB) 2, 3, 28  
 distribution, Gaussian 122, 154, 178, 179  
 distribution, multimodal 179  
 diversity 143, 146–147, 161–162  
 diversity, frequency 147, 233, 235  
 diversity, polarization 147  
 diversity, receive 143, 147  
 diversity, space 147  
 diversity, time 147  
 diversity, transmit 143, 147  
 Doppler spectrum 65–66, 78, 79, 135  
 dynamic range 23, 173–174, 176, 178, 180, 183, 184  
  
 effective number of bits (ENOB) 176, 178  
 eigen-decomposition 123, 145, 146  
 energy leakage 121, 130  
 equalizer 138–139, 240  
 erasures 31, 48, 53  
 error locations 48  
 error values 48  
  
 fast fading 67, 103, 104, 118, 138, 139, 150  
 fast Fourier transform (FFT) 195–208  
 FFT, radix-2 196–198  
 FFT, radix-4 199–200  
 FFT, radix-8 200–201  
 finite field 45–46  
 finite precision effect 174, 175, 181, 187, 188  
 FIR filter 98, 181, 187  
 flat fading 26, 63–64, 147  
 format propagation 192  
 frequency-domain equalizer (FDE) 138, 238  
 frequency-selective fading 4, 17–18, 63–64, 132  
  
 gated clock 212  
 Gaussian filter 15  
 generator matrix 42, 43, 53, 54  
 Gold code 37  
  
 guard band 18, 20, 26, 28, 31, 32, 125, 126, 234, 245  
 Gaussian-filtered frequency shift keying (GFSK) 40  
  
 Hamming distance 41, 51  
 horizontal step 54–55  
  
 inter-carrier interference (ICI) 18, 20, 68, 70, 72, 88–89, 108, 110, 139, 140  
 inter-modulation distortion (IMD) 74  
 interpolative design 190  
 interpolator 76, 109, 110, 111, 130, 131, 134, 135, 240  
 inter-symbol interference (ISI) 20, 87, 89, 90, 91, 92, 94, 96, 98  
 IQ Imbalance 70–72, 76  
  
 jitter 70, 109  
  
 least-squares (LS) 124–125, 237, 240  
 line of sight (LOS) 60, 61, 67  
 linear code 42, 43, 44, 45  
 Linear feedback shift register (LFSR) 44  
 linear least squares (LLS) 105  
 link adaptation 4  
 local annotation 192  
 local oscillation (LO) 40, 68, 70, 71, 85, 108  
 look-up table (LUT) 185–186  
 low-density parity-check (LDPC) 53–54  
  
 matched filter 96–98, 100, 102, 103, 250  
 maximal-length sequence 35–37  
 maximum Doppler frequency 65, 67, 78, 234  
 maximum likelihood (ML) 51, 93, 94, 100, 124–125, 154–155, 161, 166–167  
 Meggit decoder 45  
 memory-based FFT architecture 201–202  
 multiple input multiple output (MIMO) 4, 143–144, 145  
 MIMO detector 148, 247, 249  
 MIMO-OFDM 147–149  
 minimum free distance 50, 53  
 minimum mean squared error (MMSE) 93, 94, 122–123, 128–129, 131, 133–134, 138, 163–164  
 minimum shift keying (MSK) 11, 14–15

- multi-frequency network 2
- multi-carrier CDMA (MC-CDMA) 233–238
- multi-path delay commutator 203, 205, 206
- multipath fading 60, 61, 74, 87, 120, 147, 242
- multiple access 31, 32
- multiple access, code-division (CDMA) 3, 4, 33, 35, 37
- multiple access, frequency-division (FDMA) 7, 31, 32, 33, 34
- multiple access, time-division (TDMA) 31, 32, 33, 34
- multiple input single output (MISO) 143, 146
- multiple-access interference (MAI) 237
  
- non-data-aided estimator 116
- numerical-controlled oscillator (NCO) 108, 195, 225, 236
  
- ordered successive interference cancellation (OSIC) 164, 165, 167, 249
- orthogonal frequency-division multiplexing (OFDM) 18, 19–20, 22, 23, 24, 25, 26, 28
  
- parity-check matrix 42–44, 53–54
- path loss 60–61
- peak-to-average power ratio (PAPR) 23–24, 178, 180
- phase noise 68, 70, 76, 88–89, 107
- pipeline FFT architecture 202, 208
- PN sequence 154
- power delay profile (PDP) 62–63
- primitive element 46
- primitive polynomial 35, 36, 37, 45
- processing gain 39
- propagation error 183–185, 187, 188
- pseudo random (PN) code 35, 37, 38, 39, 40, 97, 104, 236, 237
- puncturing 53
  
- quadrature amplitude modulation (QAM) 11, 13, 14, 19
- quantization error 176, 186, 231
- quantization noise 176, 177, 178, 184, 188
- quaternary PSK (QPSK) 9, 15, 40
  
- radio resource management (RRM) 4
- raised-cosine filter 15, 17
- ring counter 211, 212, 213, 214, 216
  
- RMS delay spread 63, 250
- RMS Doppler spread 65
- RMS angle spread 68
- round-off error 182
  
- Sampling clock offset (SCO) 69, 76, 86, 89, 91, 104–108, 110, 112, 155
- shadowing 60, 61
- shift registers 36, 37, 45, 48, 49, 50, 208, 209, 211
- signal constellation 9, 11, 74, 234
- signal-to-interference-and-noise-ratio (SINR) 174
- single frequency network (SFN) 2
- single input multiple output (SIMO) 143, 146
- single input single output (SISO) 143, 145, 146
- single-path delay feedback 205–208
- singular value decomposition (SVD) 168, 169
- slow fading 67, 118
- space-frequency block code (SFBC) 4, 143
- space-time block code (STBC) 4, 143, 243, 247, 249, 250
- space-time trellis code (STTC) 4, 143
- space-time-frequency block code (STFBC) 143
- spatial multiplexing 2, 144, 158, 161, 245, 247
- spatial de-correlation 167–168
- sphere decoding 166–167
- spread, angle 67–68
- spread, delay 62–63, 249–250
- spread, Doppler 64–65, 80
- spreading factor 38–39, 233, 234
- spurious free dynamic range (SFDR) 229
- symbol timing offset 86, 90, 99
- synchronization 85–87, 90–91, 149, 151
- syndromes 43, 44, 45, 47, 48
- systematic code 42
  
- threshold orthogonality restoring combining (TORC) 238, 240
- trellis 50–52
- truncation error 182, 183, 185, 187
- twiddle factors 200, 201, 203, 206, 230
  
- vertical step 54, 56
- Viterbi algorithm 51–52

- 
- weighted least squares (WLS) 106, 107, 155, 236, 237, 239, 247
  - wide-sense stationary (WSS) 120
  - wireless local area network (wireless LAN) 5, 6–7, 22, 28
  - wireless metropolitan area network (wireless MAN) 7, 28
  - wireless network systems 5
  - wireless personal area network (wireless PAN) 5, 6, 40
  - wireless wide area network (wireless WAN) 8
  - zero padding (ZP) 20
  - zero-forcing (ZF) 163, 164